Arab Republic of Egypt
Ministry of Education
Book Sector

Science & you

LEARN AND INNOVATE

Sixth Primary

6

Student's Book

First Term

2016 - 2017

غير مصرح بتداول هذا الكتاب خارج وزارة التربية والتعليم

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Introduction

Dear pupils:

We are pleased to present this book (**Science and you**) which represents one of the cornerstones of the developed curriculum in science for sixth primary grade. This book achieves the curriculum development process to face the challanges of the twenty first century whose beginning goes in line with a competitive revolution in information and communication technology.

The curriwlum aims to achieve the following trends:

- Enlightening you with the relationship between science and technology in the science field and its impact on development.
- Ensurning the suitable situations that indicate the influence of scientific and technological progress in producing knowledge.
- Focusing on your practice of reasonable and effective behavior towards using technological outputs.
- Ensuring your acquistion of the scientific thinking methodology which enables you to move away from education based on recitation and pouring information to education based on self-learning merged with fun and excitement.
- Focusing on your dependence on exploration to reach information and acquire more experiences, through improving basic thinking skills: observation, analysis, deduction and justification.
- Providing you with opportunities to practice the roles of citizenship through self-learning methods, team work, negotiation, persuation, acceptance of the other opinion and avoidance of fanatism.
- Working on your acquisition of life skills and management applied practical abilities through giving more concern to the practical and applied aspects.
- This book consists of four units. Each unit includes integrated lessons that achieve the desired objectives of each unit.

We ask God Almighty that you gain advantage of this book. We pray Him that this book will be one of the cornerstones to be added to the love and belonging to Egypt.

Preparation Team

Prepared By

Mr. Mohamed Reda Ali Ibrahim
Dr. Mohamed Ahmed Abu Leila
Dr. Ahmed Reyadh El Sayed Hassan

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Issued: 2010
D.N: 8934/2010
ISPN: 978-977-706-002-8

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Safety in Science

Scientists know that they must work safely when doing experiments. You need to be careful when doing experiments too. Here are some safety tips to remember.

Safety Tips

- ✔ Read each experiment and activity carefully.
- ✔ Wear safety goggles when needed.
- ✔ Clean up spills right away.
- ✔ Never taste or smell substances unless directed to do so by your teacher.
- ✔ Handle sharp items carefully.
- ✔ Tape sharp edges of materials.
- ✔ Handle thermometers carefully.
- ✔ Use chemicals carefully.
- ✔ Dispose of chemicals properly.
- ✔ Put materials away you finish an experiment.
- ✔ Wash your hands throughly after each experiment.

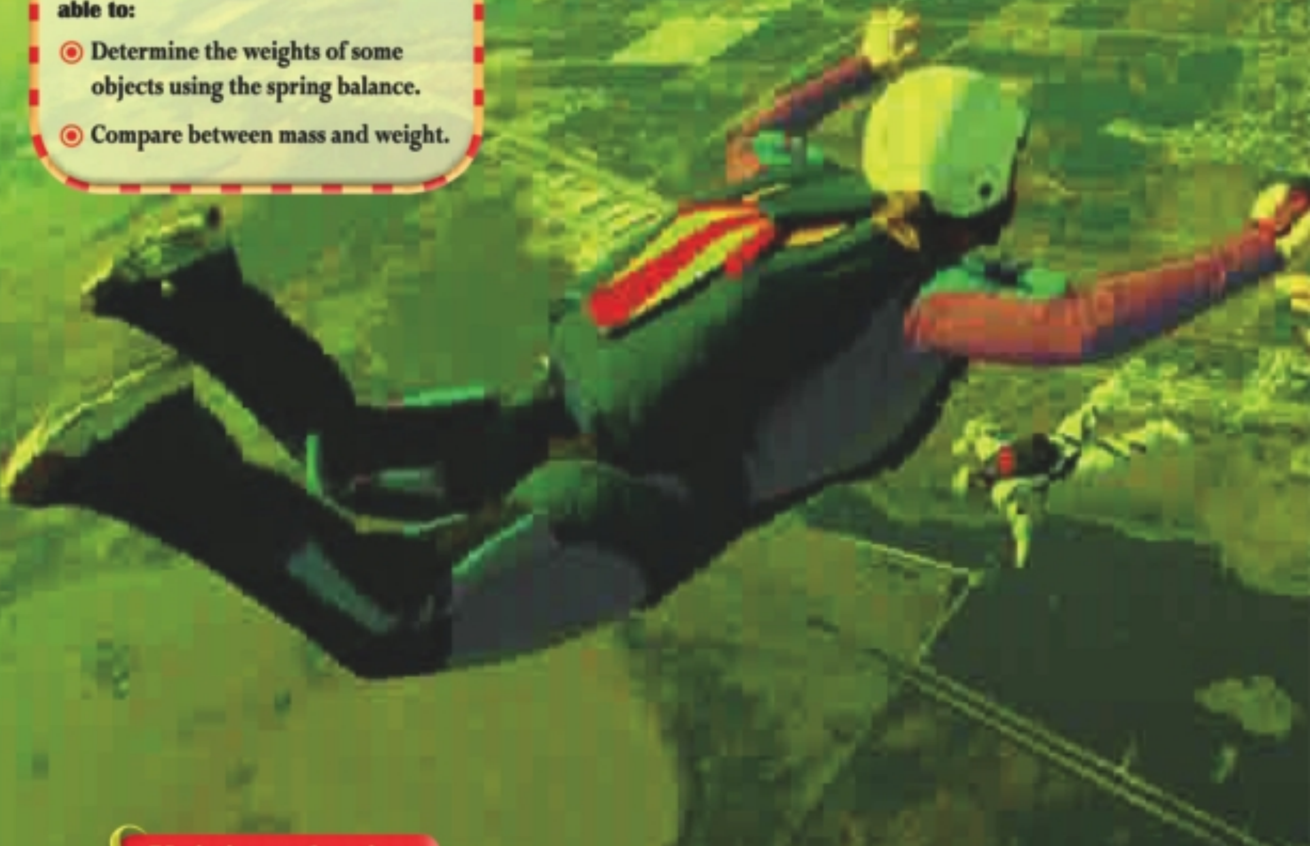
Unit 1

Force and Motion

Unit Objectives

By the end of this unit, you should be able to:

- Determine the weights of some objects using the spring balance.
- Compare between mass and weight.



Unit introduction

Mass and weight are two terms you often hear in your daily life when selling buying what is mass and weight?...... And other questions that we will try to answer in this unit.

Lesson One

Mass and Weight

Lesson One (1 -1)

Mass and weight

Objectives

By the end of this lesson, you should be able to:

- Determine the weights of some objects using the spring scale.
- Compare between mass and weight.

Basic concepts

- Mass
- Weight

The confusion between mass and weight is considered one of the most common mistakes in our daily life especially what is related to exchanging goods.

This is because the meanings of the two terms become the same in one way or another among people. Even the accurate scientific explanation does not help people to understand the real difference between mass and weight.

Fig (1-1): *A flour bag*

Discover the concept of mass

Exercise

◉ Look at the following pictures and then answer the questions:

▲10 bananas balance with 1000 grams.

▲ 9 bananas balance with 900 grams.

▲ 2 eggs balance with 120 grams.

▲ The searchlight balances with 120 grams.

Fig (1 – 2): *A group of objects of different masses.*

- Is the mass of 10 bananas equal to the mass 9 bananas? (Yes / No).Why?
- Does the mass differ according to the amount of bananas? (Yes / No).Why?
- Is mass of the matter in eggs equal to the matter of the searchlight? (Yes / No). Why?

◉ **In this exercise**, we find that: the mass of bananas depends on its amount. This means that mass depends on the amount of matter. We also find that the mass of eggs is equal to the mass of the searchlight. This means they both contain two equal amounts of matter.

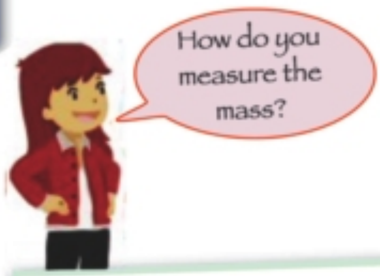
★ *Mass:* **the amount of matter in an object.**

★ **Mass is measured by gram or kilogram. The gram may equal to the mass of a paper clip whereas the kilogram is equal to a liter of distilled water.**

Fig (1 – 3): *A paper clip is equal to one gram.*

Fig (1 – 4): *A liter of water is equal to 1000 gram.*

Mass and weight



Mass measurement:

Different types of scales are used to measure the mass such as: The balance scale and one-arm scale.

▲ A balance scale

▲ A sensitive two-arm scale

▲ A one-arm digital scale

▲ A one-arm scale with a pointer

Fig (1 – 5): *Different types of scales*

Enriching information

There is a relation between mass and motion. The more an object's mass increases, the more difficult it is to change its speed. For example, the locomotive has bigger mass than the car, so the locomotive needs a stronger force to stop than what is needed for the car.

We should point out that the scale's choice should match the amount of matter we need to measure its mass.

For example, the grocer's balance cannot be used to measure the mass of gold and vice versa.

Activity

How do we measure mass?

- What do you need? A balance scale, standard masses, the object that we need to measure its mass.

What should you do?

- Put the balance scale on a stable shelf horizontally to avoid any vibrations.
- Make sure that the balance scale is clean in and out.
- Put the object on one of the arms.
- Put standard masses on the other arm until the two arms balance.
- Add up the written numbers on the standard masses. The total is the mass of the object.

Fig (1 – 6): *Two-arm scale with mass known weights*

★ *We conclude that:* **The object mass is equal to the total mass of balance masses that are already known.**

Does mass differ from one place to another?

After measuring the mass of an object on the Earth's surface then measuring the mass of the same object on the moon's surface, we will notice that mass is not changed, i.e. mass of objects is stable and does not change from a place to another.

▲ The object mass on the Earth is 5 kg.

▲ The object mass on moon is 5 kg.

Fig (1 – 7): *Object's mass is constant and does not change from one place to another.*

Mass and weight

The concept of weight:

Discover the concept of weight

Exercise

⊙ **Look at the following pictures, and then answer the questions:**

Fig (1–8): *Children on the Earth surface*

Fig (1–9): *A astronaut inside a spacecraft*

- Does the astronaut fall down when he jumps from a high position? (Yes / No).
- If the astronaut carries something and leaves it, will it fall down? (Yes / No).
- Does a person fall down when he jumps up on the Earth's surface? (Yes / No).
- If you carry your pen and leave it while you are on the Earth's surface, will it fall down?
- What makes objects fall downwards the Earth? ....

⊙ The truth of objects' falling downward the Earth means that there must be a force which pulls these objects down. You can feel this force if you carry an object or if you try lifting an object. This force is called "weight".

- ★ ***Weight:*** **is the force with a body is attracted to the Earth. This force is always towards the centre of the Earth.**
- ★ **Weight is measured by Newton. Newton is almost equal to the weight of an object whose mass is 100 grams. For example, the gravitational force for a small apple (its mass is 100 grams) is equal to Newton.**
- ★ **Given that the acceleration of the earth gravity equal 10 m/sec^2.**

Fig (1-10): An apple.

Measuring weight

A weight of an object can be measured by the spring balance through determining the distance a spring goes down under the object's weight.

Fig (1–11) *The spring scale*

Activity

How can weight be measured?

◉ **What do you need?** A spring scale, an object (can)

◉ **What should you do?**

- Hold the spring scale from its top hook. Then, hang the object in the bottom hook. If you can not hang the object in the bottom hook, tie it with thread and then tie the thread in the bottom hook.
- Let the object go down slowly. You will notice that the object pulls the spring downwards and the reading of the pointer increases.
- Wait until the object becomes stable and then read the number which refers to how many Newton the down force is exerting and equal to the object weight.

Fig (1–12): *How do you measure the weight?*

Factors that affect weight

The object is affected by three factors:

(1) The object mass.

(2) The planet (place) where the object exists.

(3) Distance from the center of the planet.

We will discuss these factors in details:

1 The object mass

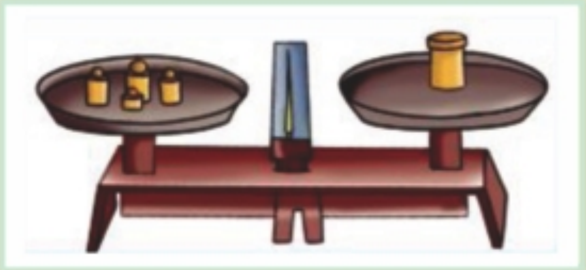
The object mass affects its weight. You can make sure of this by doing the following activity:

Mass and weight

Activity

Discover the relation between mass and weight

◉ What do you need? a normal scale, a spring scale, some objects different in mass.



◉ What should you do?

- Assign the first object's mass using the normal scale.
- Assign the first object's weight using the spring scale.
- Repeat the previous steps with the rest of the objects.
- Write down the results in a table.

◉ Suppose you got the following results

The object's mass (kg)	1	2	3	4	5
The object's weight (Newton)	10	20	30	40	50

What is the relation between mass and weight?

We can conclude that the weight of an object on the surface of the Earth increases according to the increase in the object's mass.

Weight (Newton)= mass (kg) x 10

2 The planet where the object exists

Weight differs according to the planet or (the moon) where the object exists. The more the planet's mass increases, the more the gravitational force and the more the object's weight become. For example, on measuring an object's weight on the surface of the Earth, and then measuring the same object on the surface of the moon, we notice that weight changes.

Fig (1 – 13): *The object's weight on the Earth's surface is equal to 6 Newton.*

Fig (1 – 14): *The object's weight on the moon's surface is equal to 1 Newton.*

◉ An object's weight on the moon is equal to one sixths ($\frac{1}{6}$) of its weight on Earth.

3 Distance from the center of the planet:

An object's weight is affected by the distance being away from the center of the planet. The Earth gravitational force decreases as the body moves away from the Earth. We don't usually notice this difference in weight because it is very little in such a case.

Fig (1 – 15): *A balloon*

Comparison between mass and weight:

Point of comparison	Mass	Weight
Definition	The amount of matter in an object	The force with which a body is attracted to the Earth
Unit of measurement	Kilogram or gram	Newton
Device of measurement	A balance scale	A spring scale
direction	Has no direction	It is towards the center of the Earth
Effect of different places	Constant (does not change with the change in place)	Changes from plant to another

Mass and weight

Exercises

1 Complete the following sentences:

a. The measuring unit of mass is .... or .... whereas the measuring unit of weight is ....

b. Mass is measured by .... whereas weight is measured by ....

c. Mass is a constant and is not affected by ....

d. An object's weight depends on .... , ...

2 Write the scientific term:

a. The amount of matter in an object.

b. The force with which a body is attracted to the Earth.

c. The measurement unit of mass which is almost equal to a mass liter of water.

d. The measurement unit of weight which is almost equal to a mass 100 grams.

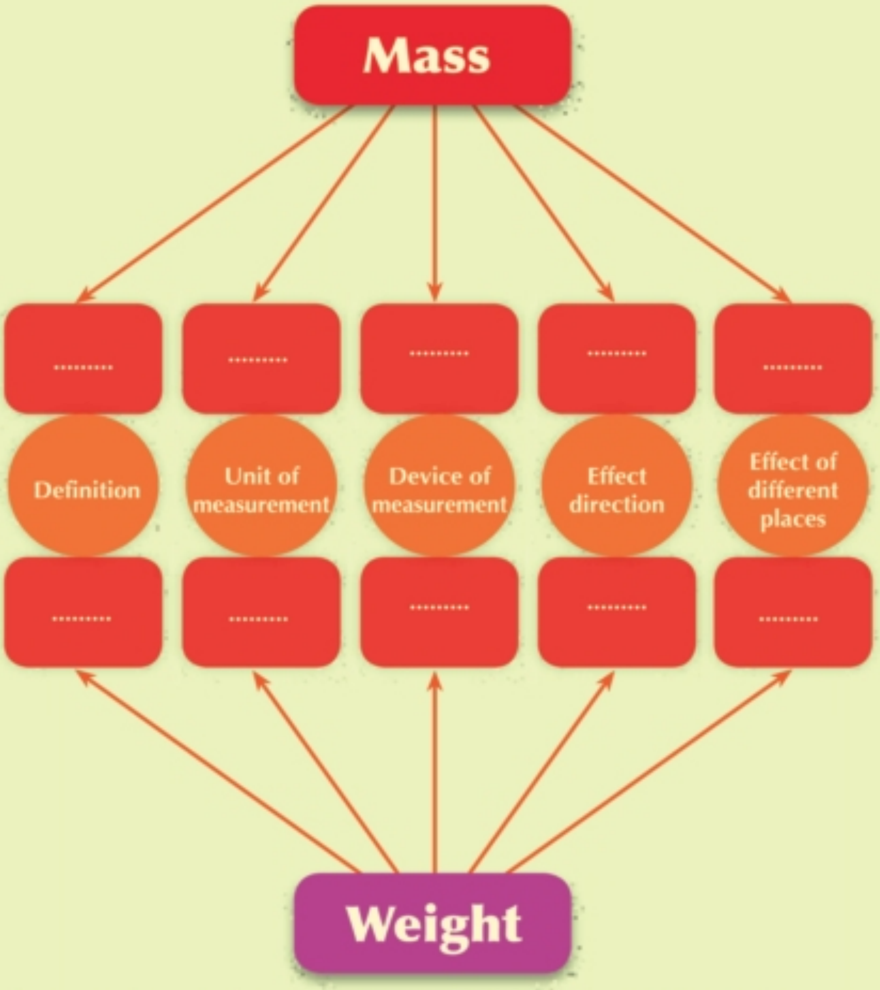
3 An object whose mass on Earth is equal to 6 kg. Calculate its weight on both surfaces of the Earth and the moon.

4 The following pictures illustrate the steps of calculating a liquid mass using the digital scale. Look at the pictures and then calculate the mass and weight of this liquid.

▲ Scale reading = 119.76 gm

▲ Scale reading = 186.73 gm

5 Complete the following diagram.



6 Match from column (A) with the suitable term in column (B):

(A)
The force with which a body is attracted to the earth
The measuring unit of mass
The measuring unit of weight
The amount of matter in an object

(B)
Newton
Mass
Kg
Weight
Spring scale

General activities on mass and weight

Activity(1) :

- Write an essay on the old and new measurement tools of mass and weight showing the different types of these tools and the effects of the progress of science and technology progress on the accuracy of these tools.

Activity(2) :

- Write a research on the importance of measuring mass in daily life.

Activity(3) :

- Have an interview with the school doctor about the dangers of extra weight on human's health.

Unit (1) Test

1 Choose the right answer:

a The device of measuring weight is ....

1 one-arm scale. 2 two-arm scale. 3 digital scale. 4 spring scale

b An object whose weight is 20 Newton on earth, its mass is equal to ....

1 10 kg. 2 2 kg. 3 200 kg. 4 20 kg.

2 Complete the following sentences:

a Mass is measured by .... whereas weight is measured by ....

b Mass is the amount of matter that body contains. It does not change according to ....

c An object's weight depends on ...., ... and ....

3 Fill in the following table:

Point of Comparison	Mass	Weight
Definition		
Unit of measurement		
Device of measurement		
Direction		
Effect of different places		

4 If an object's mass = 30 kg on Earth, calculate:

a Its mass on the moon.

b Its weight on the Earth.

c Its weight on the moon.

Unit 2

Thermal Energy

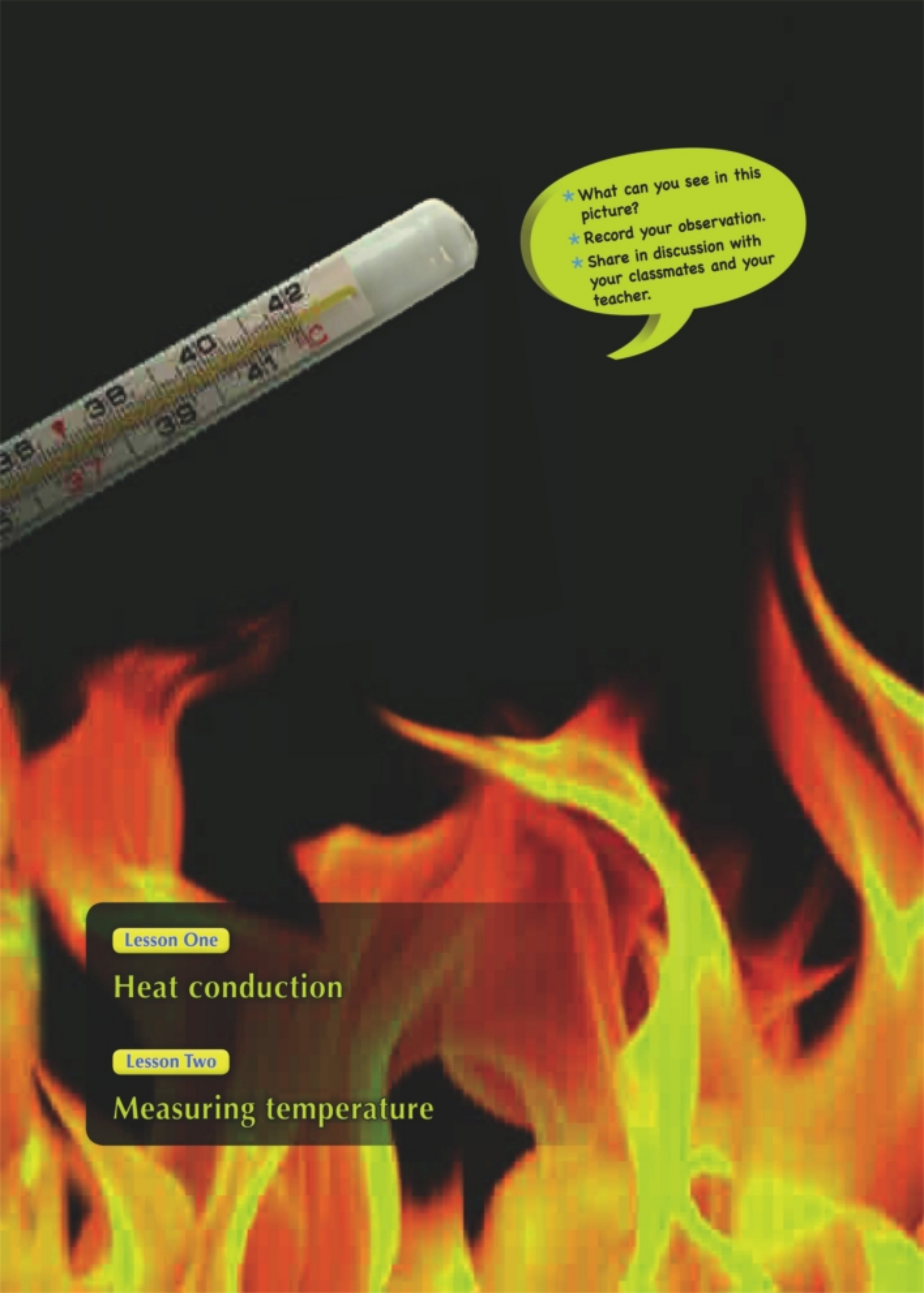
Unit Objectives

By the end of this unit, you should be able to:

- **Determine some materials that are good conductors of heat or bad conductors of heat.**
- **Do experiments to show the various metals to conduct heat.**
- **Determine the usages of the good and bad conductors of heat.**
- **Compare between the medical thermometer and Celsius thermometer in usage and structure.**

Unit intriduction

Heat is used in our daily life in different aspects. Heat flows from an object to another when they are different in temperature. Some materials are good conductors of heat while others are bad conductors of heat. So, we will see some examples of each type and their different usages as well as different types of thermometers used in measuring temperature.



* What can you see in this picture?
* Record your observation.
* Share in discussion with your classmates and your teacher.

Lesson One

Heat conduction

Lesson Two

Measuring temperature

Lesson One (2 -1)

Heat conduction

Objectives

By the end of this lesson, you should be able to:

- Do simple experiments to determine some materials that are good conductors of heat or bad conductors of heat.
- Do experiments to show the different degrees of various metals to conduct heat.
- Determine the usage of the good and bad conductors of heat.

Basic concepts

- Heat
- Temperature
- Good conductors of heat
- Bad conductors of heat

Heat is one of the most important types of energies used in our life. We use it at home in various areas such as warming the house, cooking, water heating and drying washed clothes.

In industry, heat has countless usages. It is used in making and processing food, glass, paper, textiles, ... etc.

Different uses of heat

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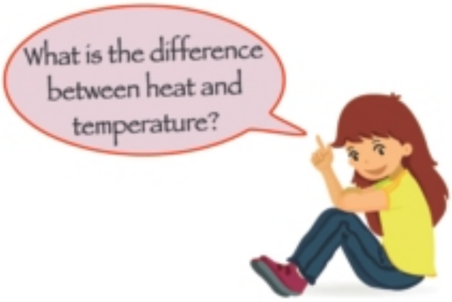
Heat

It is a form of energy that transfers from the higher-temperature object to the lower temperature object.



Temperature

It is the degree of hotness or coldness of a body. Special devices are used to measure temperature. These devices are called **thermometers**.

Activity
Find out the good and bad conductors of heat

What do you need? A glass container, a metal spoon, plastic ruler, wooden pencil, molten wax, hot water, clay, three buttons.

Fig (2–1) *Different materials differ in conducting heat.*

What will you do?

- Stick buttons on the reuler, spoon and pencil using the molten wax.
- Fix the ruler, spoon and pencil to the edge of the contaniner and stick them using clay.
- Pour the hot water in the container but not to its edge.

What do you notice? ....

What do you conclude? ....

★ We can conclude that:

- **The different materials (such as plastic, wood and aluminium) differ in conducting heat.**

Heat conduction

Activity

Materials differences in conducting heat

◉ **What do you need?** burner , beaker contains water, and 4 rods of different materials.

◉ **What should you do ?**

- Prepare 4 rods nearly equal in length and thickness from Aluminum, wood, iron and plastic.
- Put the beaker containing water on the flame and heat water then put the 4 rods inside hot water
- Touch the Aluminum rod from its end.
- Can you feel it hot?
- Repeat the prevuious steps with the other rods one by one.

Fig (2-2) *The difference in materials leads to the difference in conducting heat.*

◉ **What can you conclude?** ....

....

★ *We can conclude that:* materials differ in conducting heat and are classified into two types:

- *Good conductors of heat:* these are the materials that conduct heat and let heat flow through such as copper, aluminium, iron and mercury.
- *Bad conductors of heat:* these are known as insulators that do not let heat flow through such as wood, glass, plastic, paper, and air.

Life applications

Air is a bad conductor of heat. That's why it is used in making insulating glass windows.

The window is made by bonding two sheets of glass and maintaining a space between them filled with air to ensure preventing leakage of heat.

Fig (2-3) *Double glazed window*

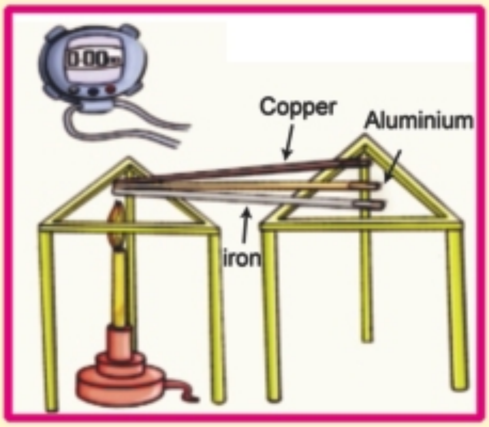
Activity

Comparing conducting heat

What do you need? Two metal racks, three metal rods with the same length and thickness of copper, aluminium and iron, paraffin wax, office pins, flame, stop watch.

What should you do?

- Lit the paraffin wax and put some drops of molten wax on the tip of each metal rack.
- Stick an office pin on each tip of each metal stem before the wax gets hard.
- Put the three metal stem on the two metal racks as shown in the figure.
- Put the tips of the three metal stems that do not contain paraffin wax above the flame.
- Calculate the required time to drop the office pins from each rod.
- Write down your notes in the opposite table.



The difference in conducting heat of the metals

Metal	Time (second)
Aluminium	
Copper	
iron	

What do you notice? ....

....

What do you conclude? ....

....

★ *We can conclude that:*

- **Different metals differ in conducting heat. We find out that copper conducts heat faster than aluminium and iron do.**

Life issues

As a result of heat flow through metals, metals expand and get bigger. So, we find spaces between railways, otherwise they expand and twist; an act and that causes train accidents.

Heat conduction

Usages of good and bad conductors of heat:

1. Aluminium and stainless steal are used to make cooking pots and kettles in houses and factories.

2. Plastic and wood are used to make handles of cooking pots, kettles and utensils. Moreover, plastic is used to make the iron handle.

3. Heavy blankets and wool clothes are bad conductors. Therefore, it they are used in winter to keep the body warm.

Exercises

1 Complete the following sentences:

a) All metals are .... conductors of heat.

b) .... conducts heat faster than aluminium.

c) Some examples of good conductors of heat are .... and ....

d) Some usages of good conductors of heat are ...., ... and ....

e) Some examples of bad conductors of heat are .... and ....

f) Some usages of bad conductors of heat are ...., ... and ....

2 Put (✔) in front of the right statements and (✘) in front of the false statements and correct the false ones:

a) All materials are good conductors of heat. ( )

b) Wood is a good conductor of heat. ( )

c) Cooking pots are made of plastic. ( )

d) Handles of cooking pots are made of copper. ( )

e) Aluminium is a bad conductor of heart. ( )

3 Provide the scientific term for each sentence:

a) Materials that let heat flow through.

b) Materials that do not let heat flow through.

4 Compare between the good and bad conductors of heat.

UNIT 2

Lesson Two (2 -2)

Meauring temperature

Objectives

By the end of this lesson, you should be able to:

- Compare between the medical and celiesus thermometers.
- Appreciate the importance of thermometers in our daily life.

Basic concepts

- Thermometer
- Medical thermometer
- Celsius thermometer

Measuring temperature is one of the important things in our daily life. It helps us know the weather temperature which affects our life skills. We know our bodies` temperature to check our health condition. Also, it is very important because some processed food industries recquire a certain temperature. But can we find out if an object is hot or cold by touching it only, or do we need a device to know the temperature accurately?

Heat is used in preparing food

Thermometer

It is a device used to measure temperature.

Fig (2-4): Medical Thermometer

How the thermometer works

To identify how the thermometer works, cooperate with your classmates in doing the following activity:

Activity
Make a thermometer on your own

◉ **What do you need?** Water, ethyl alcohol, plastic bottle, red color, straw, clay, a beaker with hot water, a beaker with iced watercolouring crayon (black, blue and red)

◉ **What should you do?**

- Fill half the bottle with similar two quantities of water and ethyl alcohol.
- Add some drops of the red color and stir.
- Put the straw in the bottle where it does not touch the bottom of the bottle.
- Use the clay to fix the straw and close the mouth of the bottle.
- Cut two cracks in the hard paper then fix the straw through the two cracks. Mark the liquid level using a coloring crayon.
- Put the bottle in a beaker with hot water ; and notice what will happen to the liquid inside the straw.
  Mark the liquid level using a new coloring crayon.
- Put the bottle in a beaker with iced water and notice What will happen to the liquid inside the strow, Mark the liquid level using a new clouring crayon.

Thermometer model

◉ **What do you notice?**...

◉ **What do you conclude?** ....

★ *We can conclude that:*

- **The main idea to make a thermometer is changing the volume of the liquid according to the temperature. The liquid expands by heating and contracts by cooling.**

Measuring temperature

Fig (2-5): *Medical thermometer*

Types of thermometers

There are many kinds of thermometers:

- Medical thermometer
- Celsius thermometer

1 Medical thermometer

Structure of the medical thermometer:

- The medical thermometer consists of:
  - A transparent glass tube which includes a capillary closed from one of its ends.
  - The other end from the capillary tube is connected to a bulb filled with mercury.
  - There is a constriction above the bulb which prevents mercury from going back to the bulb quickly in order to read the measurement easily.
  - The thermometer scale starts from 35°C to 42°C and every degree is divided into ten parts.

Technology applications

There are some modern digital thermometers which display body temperature digitaly and are used to measure body temperature espicially for children.

Enriching information

Did you know that the temperature of a healthy human is 37°C and it may go up during sickness.

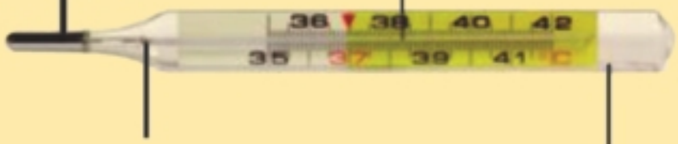


Fig (2-6): *Structure of medical thermometer*

Use the medical thermometer to measure your temperature

- Sterilize the medical thermometer using ethyl alcohol.
- Dry the thermometer very well using a paper tissue.
- Shake the thermometer well until mercury goes back to the bulb.
- Put the thermometer under the tongue for a minute.
- Get the thermometer out from the mouth and record the reading on it.
- Sterilize the thermometer using Ethyl alcohol and put it in its box.

Medical thermometer is used in measuring human temperature

** We can conclude that:*

- **The medical thermometer is used to measure the temperature of the human body and through the identification number of thermometer which depends the level of mercury surface and which indicates the temperature of the human body.**

Be careful

Do not seize the thermometer firmly with your teeth in order not to be broken because mercury is toxic.

Measuring temperature

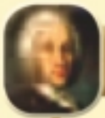
Fig (2–7): *The Celsius thermometer measures the water temperature.*

2 Celsius thermometer

Parts of Celsius thermometer

- It consists of:
  - A transparent glass tube with a capillary tube closed from one of its ends.
  - The other end of the capillary tube is connected to a bulb filled with mercury, but there is no constriction above the bulb.
  - The thermometer scale starts from zero Celsius until 100 degrees Celsius. Every degree is divided into ten parts.

Fig (2–8): *Celsius thermometer*



Scientists helped humanity

The Swedish scientist "Andres Celsius" created the Celsius scale in 1742. He considered the zero as the melting point of ice and 100° is the boiling point of water.

He divided the distance into 100 parts, each part is equal to one degree.

Why is mercury preferred in making a thermometer?

1. It is a liquid metal that can be seen easily through the thermometer glass.
2. Mercury is a good conductor of heat.
3. Mercury is a regular expanding material which gives an accurate estimation.
4. Mercury does not stick to the walls of the capillary tube.
5. Mercury remains liquid between two degrees temperature -39°C and 357 °C and this gives awide range to temperature measurement.

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Activity

Use the Celsius thermometer to measure the liquid temperature

What do you need? A Celsius thermometer, a glass of hot tea, a bottle of cold soft drink, a beaker of warm water.

What should you do?

- Put the thermometer in the hot tea. Wait until mercury rises and stops and record the temperature.
- Repeat the previous step but with the cold soft drink and the warm water and record the temperature of each.

The liquid that we need to measure its temperature	Temperature
Hot tea	
Cold soft drink	
Warm water	

The measuring temperature of liquld is used by Celsius thermometer

Be careful

While recording the temperature, the thermometer must be vertical. The direction of sight must be perpendicular to the thermometer.

What do you notice? ....

What do you conclude? ....

★ We can conclude that:

- **The Celsius thermometer is used in measuring the temperature of liquids.**

Enrichent information

Celsius thermometer is known by this name due to the dividing of distance between ice melting point and water boiling point into 100 divisions.

The Celsius and the medical thermometers

Exercise

Compare between:

- Celsuis thermometer and medical thermometer:

Points of Comparison	Celsius thermometer	Medical thermometer
Structure	....	....
Range of scale	....	....
Constriction	....	....
Used liquid	....	....
Usage	....	....

Enriching information

Some thermometers contain two scales, one represents celsius scale (°C) and the other represents fahrenheit scale (°F).

0°C = 32°F and 100°C = 212°F

Exercises

1 Complete1the following sentences:

a The scale of the medical thermometer starts from .... and ends at ....

b There is a constriction in the .... thermometer.

c The kinds of thermometers are .... and ....

d The Celsius thermometer is used in .... whereas the medical thermometer is used in............ .

e The thermometer is ....

f The water is freezed at .... and boiled at ....

2 Put (✔) in front of the right statements, and (✘) in front of the false statements and correct the false ones:

a The Celsius thermometer is used for measuring the temperature of the human being. (   )

b The scale of the medical thermometer starts from zero until 100 Celsius degree. (   )

c The medical thermometer is used for measuring the temperature of liquids. (   )

d There is a constriction above the bulb in the Celsius thermometer. (   )

e The used liquid in the medical thermometer is water. (   )

3 Write the scientific term for each of the following statements:

a A device used to measure the temperature of liquids.

b A device used to measure the temperature of the human being.

c The liquid used in making thermometers.

4 Compare between the medical and the Celsius thermometer in structure and usage.

5 Write a paragraph on your own on each of the following concepts:

Instruments used in measuring the temperature

The medical thermometer | The Celsius thermometer

Unit (2) Test

Unit (2) Test

1. Complete the following sentences:
   a. We measure temperature by using ....
   b. .... is used in measuring temperatures of different liquids whereas .... is used in measuring the temperature of the human body.
   c. ...., ... and .... are good conductors of heat
   d. ...., ... and .... are bad conductors of heat

2. Write the scientific term for each of the following statements:
   a. A device used to measure temperature.
   b. The materials that allow the flow of heat inside.
   c. The materials that do not allow the flow of heat inside.

3. Write the most important uses of the good and bad conductors of heat.

4. Fill in the spaces of following tables:

Points of comparison	Medical thermometer	Celsius thermometer
Usage		
Structure		
Used liquid		
scale		

Points of comparison	Good conductors of heat	Bad conductors of heat
Definition		
Usage		
Examples		

5 **Put (✓) in front of the correct statements and (✖) in front of the false one and correct the false ones:**

a. Medical thermometer is used in measuring the temperatures of different liquids. ( )

b. The scale of the Celsius thermometer starts from 35° to 42°. ( )

c. Aluminum is a bad conductor of haet. ( )

d. Wood is a good conductor of heat. ( )

6 **Write an explenation for each of the following:**

a. Mercury is used in thermometers.

b. The handles of cooking utensils are made of wood or plastics.

c. Cooking utensils are made of stainless steal or aluminium.

d. There is a constriction in the medical thermometer.

Unit 3

The Atmosphere

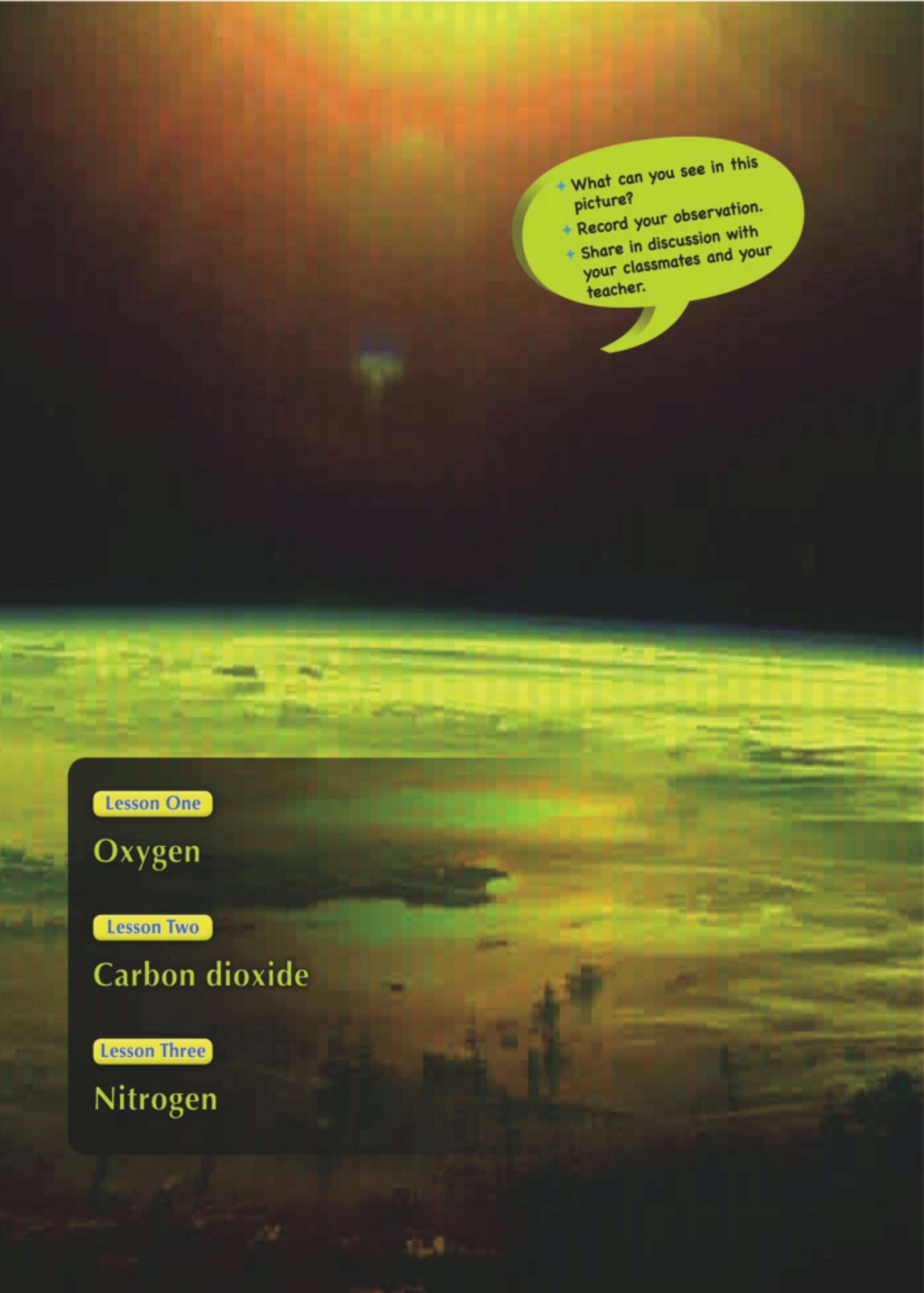
Unit Objectives

By the end of this unit, you should be able to:

- Mention the gases composing the air and their proportions.
- Identify the properties of oxygen.
- Determine the importance and uses of oxygen.
- Do experiments illustrating the properties of carbon dioxide.
- Determine the importance and the uses of carbon dioxide.
- Identify the properties of nitrogen.
- Determine the importance and uses of nitrogen.

Unit Introduction

The Earth's atmosphere consists of a mixture of gasses surrounding it. Nitrogen represents a proportion of 78% of the volume of these gases. Oxygen repesents, 21% of the volume of the this atmosphere. As for the rest of the atmosphere, it consists almost of water vapor, carbon dioxide and other gass such as argon, neon, helium, and othere. In the study of this unit, you will identify the properties, uses and importance of the gases that compose most of the air's components. They are oxygen, carbon dioxide and bitrogen as well as the importance of each one in nature



- What can you see in this picture?
- Record your observation.
- Share in discussion with your classmates and your teacher.

Lesson One

Oxygen

Lesson Two

Carbon dioxide

Lesson Three

Nitrogen

Lesson One (3 -1)

Oxygen

Objectives

By the end of this lesson, you should be able to:

- Mention the gases composing the air and their proportions.
- Identify the properties of oxygen.
- Determine the importance and uses of oxygen.

Basic concepts

- The atmosphere
- Oxygen

What are the sources of oxygen in the air?

Green plants are the main source of oxygen in the air. Oxygen is produced during the photosynthesis process in order to compensate the consumption of oxygen in the respiration and combustion processes. So, the Earth's vegetation should be maintained.

Plants are the main source of oxygen

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The atmosphere is composed of a mixture of gases surrounding the Earth. They are attracted to the Earth by gravity.

Learn about these gases and their proportions as in figure (3 – 2):

Fig (3 – 1): *The atmosphere of the earth*

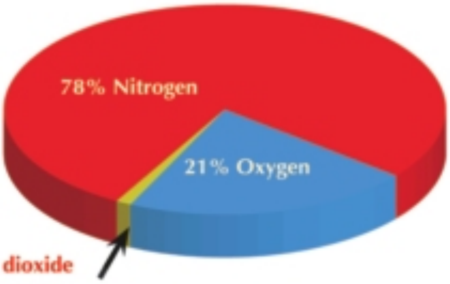


Fig (3 – 2): *Ratios of gases in the atmosphere*

You notice that nitrogen represents 78% of the total percentage of these gases. Oxygen represents 21% of the volume of the atmosphere. The remaining part of the atmosphere consists of water vapor, carbon dioxide and other gases such as argon, neon, helium and others.

The atmosphere protects the Earth by absorbing ultraviolet radiation coming from outer space. Also, it adjusts the temperature of the Earth's surface.

There are large quantities of solid objects in the atmosphere. These solid objects are dust particles, smoke and gases produced by factories, cars, trains and ships. Although solid objects are considered air pollutants, they help in the condensing of water vapor around and falling in the form of drops of rain or snow.

Fig (3 – 3): *Ships send out smoke and gases which pollute the atmosphere.*

Oxygen

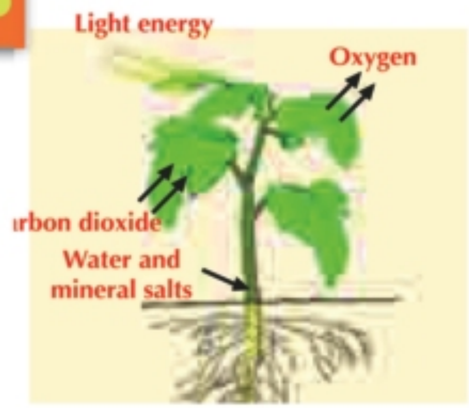
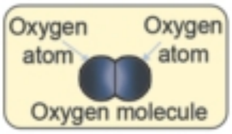


Fig (3 – 4): *Plants are the main source of oxygen.*

Oxygen:

Oxygen is produced according to the availability of green plants. It is produced during photosynthesis Figure (3-4). Oxygen exists in the atmosphere in a gaseous state. It consists of two-atom-molecules that have the composition O_2 (the first letter of the word oxygen).



Although oxygen is consumed in respiration and combustion, this shortage is always compensated through the sustainability of photosynthesis. Therefore, its proportion stays fixed in the air.

Activity
Calculate the percentage of oxygen in the air

◉ **What do you need?** A glass basin, a graduated cylinder, a candle, colored water.

◉ **What should you do?**

- Fix a lighted candle inside a basin containing colored water.
- Cover the candle with the graduated cylinder.
- Determine the water level outside and inside the cylinder.

◉ **What do you notice?** ....
....

- Share in discussion with your classmates: Which component of the air got reduced and replaced with water? ....
....
- Calculate the volume of water that rose inside the cylinder and record it ....
....

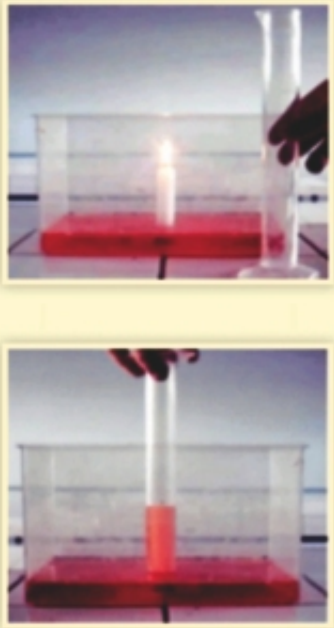


Fig (3–5) *Oxygen occupies one fifth of the air volume.*

★ *We can conclude that:* **water rises into the cylinder with one fifth of its volume. This occurrs as a result of air's loss of one of its components which is oxygen consumed by the candle during burning.**

Oxygen occupies one fifth of the air volume.

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Activity

Preparation of oxygen in the laboratory

◉ **What do you need?** A glass flask, a stopper of two holes, a glass funnel with a faucet, a glass tube, a glass container, some glass cylinders, water, hydrogen peroxide (you can get it from pharmacies), manganese dioxide.

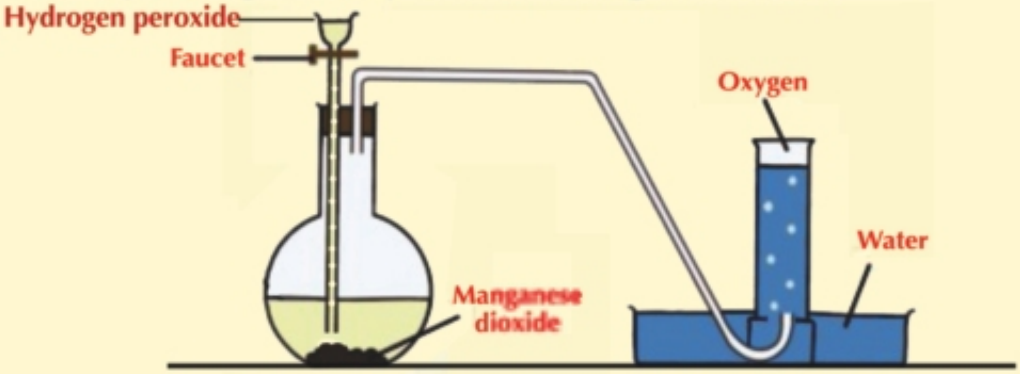


Fig (3–6) *Oxygen gas evolves as result of the analysis of hydrogen peroxide under the effect of manganese dioxide.*

◉ **What should you do?**

- Configure the apparatus shown in the figure (3-6) with the assistance of your teacher and your colleagues.
- Pour some manganese dioxide in the flask.
- Fill the funnel with hydrogen peroxide.
- Open the faucet to allow the leaking of some hydrogen peroxide on manganese dioxide.
- What do you notice? ....
- Close the faucet when the cylinder is filled with gas and then close the cylinder mouth and get the cylinder out of the container.
- Repeat the same steps to examine the properties of oxygen.

★ *We can conclude that:*

- **Hydrogen peroxide dissociates in the presence of manganese dioxide (as a catalyst) into water and oxygen gas (manganese dioxide remains without a change in quantity and properties and so it is called a catalyst).**

Scientists who benefitted humanity

Oxygen was discovered in China in 800 BC. Then, it was re-discovered by Joseph Priestley in August 1774. Antoine Lavoisier gave it the name "oxygen" in 1778.

Oxygen

The properties of oxygen

There are a lot of compounds containing oxygen such as hydrogen peroxide (oxygen water) and some salts.

Activity

Explore the properties of oxygen

◉ **What do you need?** Glass cylinders filled with oxygen, water, matches.

◉ **What should you do?**

- Take a cylinder filled with oxygen and test its color and smell. What do you observe? ....
- Take a cylinder filled with oxygen and turn it upside down in a container filled with water. Does the water rise inside the beaker? ....
- Take a cylinder filled with oxygen, turn it over on the opening of another cylinder and insert a burning fragment in the upper cylinder and then in the lower cylinder.
- Insert a lighted magnesium ribbon in a cylinder filled with oxygen .

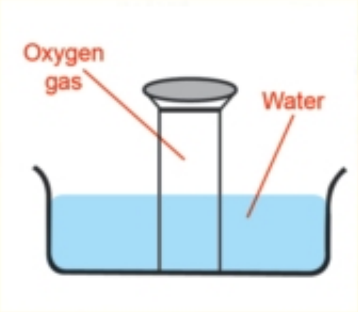


Fig (3-7):

◉ **What do you observe?** ....

Fig (3-8) *Oxygen is a colorless gas.*

Fig (3-9) *Oxygen does not burn, but it helps in burning.*

The properties of oxygen can be identified as follows:

- ◉ Oxygen is a colorless, tasteless and odorless gas. figure (3-8).
- ◉ It scarcely dissolves in water.
- ◉ Oxygen does not burn, but it helps in burning. figure (9-3).
- ◉ It has a neutral effect on litmus paper with its two colors.
- ◉ Oxygen is heavier than air as it replaces the air.
- ◉ Oxygen combines with lighted magnesium to form magnesium oxside. (white matter)

★ *We can conclude that:* **Oxygen is characterized by its ability to unite directly with most elements forming oxides. If this union is rapid and produces heat and light, it is named "burning", whereas if it is slow and in the presence of moisture (water), it is named "oxidation". like formation of iron rust.**

Activity

How is the iron rust formed?

- **What do you need?** Some nails or a piece of **cleansing dishes wire made of iron, water.**
- **What should you do?**
  - Wet the nails or the cleansing wire with water and leave it for several days in a humid atmosphere. What do you observe? ....
  - Compare between the iron after and before exposure to moisture.

Fig (3-10) *Rusty nails after exposure to moisture*

This explains the erosion of ironware such as the bridges' pillars. As time passes, if they are not isolated with paints, they cause damages.

Activity

Does the mass of materials increases after combination with oxygen?

- To verify this, do this activity with your colleagues and your teacher.
- What do you need? a digital scale, cleansing wire, tinfoil and stove.
- **What should you do?**
  - Make two balls of cleansing wire of the same weight by using the scale.
  - Take one of the balls with a pair of tongs and set it on the stove. When the inner part of the ball becomes red, put the ball on an aluminium plate until the flame extinguishes.
  - Using the scale, compare the weight of the two balls again. Which one got burned and which did not in terms of weight.
  - Record your observations and discuss them with your colleagues and your teacher.

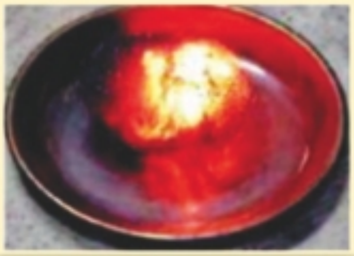


Fig (3-11) *A piece of burning cleansing wire.*

★ *We can conclude that:* **the cleansing wire gets burned because the outer surface of the wire is large enough to react with oxygen in the air. So, combustion occurs quickly. The wire becomes heavier after burning because oxygen combines with iron forming iron oxide.**

Oxygen

The importance and uses of oxygen:

Oxygen has a great importance to the human life and all living organisms. The molecule of water consists of oxygen atom united with two atoms of hydrogen. It is also important for respiration and food combustion processes inside living cells to produce energy necessary for vital processes.

Ozone is also composed of Three atoms of oxygen (O_3) which forms the ozone layer. It is a layer in the atmosphere that protects the Earth from harmful radiation that comes from the sun. Oxygen gets compressed in iron cylinders and used in:

- Mechanical ventilation for patients who suffer from breathing difficulties.
- During surgeries.
- During diving and climbing mountains. because oxygen becomes lighter when we have rise above the Earth's surface.
- Oxygen is also used in cutting and welding metals when combined with acetylene gas to produce *"oxy-acetylene"* flame whose temperature reaches 3500°C sufficient to melt metals.

Figure (3–12) *The ozone layer protects the Earth.*

Figure (3–13) *Oxygen is used in welding.*

Exercises

1 Put (✓) in front of the true statements or (x) in front of false statements.

a- Oxygen gas is produced according to the availability of green plants during photosynthesis process. ( )

b- Oxygen gas is prepared from hydrogen peroxide dissociates in the presence of carbon dioxide gas. ( )

c- The mass of materials is decreased after combination with oxygen. ( )

d- Ozone gas is composed of 2 atoms and it has the symbol of O_3. ( )

e- The erosion of material which made of iron when exposed to moisture. ( )

f- Oxygen combines with a lighted magnesium riboon forming white substance. ( )

2 Think and answer: If you know that oxygen does not burn but helps in burning. What happens to our lives if the oxygen percentage in the air is more than 21%?

3 Justify:

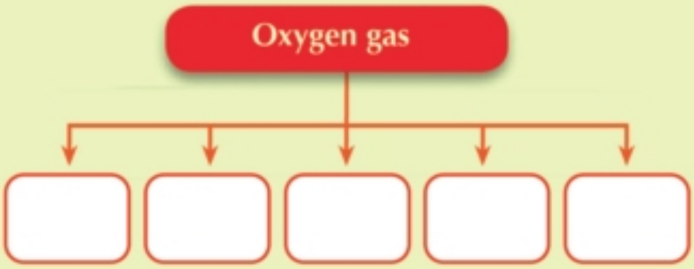
a. Although oxygen is consumed during respiration, its percentage remains stable in the atmosphere.

b. Oxygen is created by displacing the water downward in the flask during preparation at the laboratory.

c. The atmosphere has a great importance for the continuity of life on the planet.

4 Oxygen has a great importance for life on the planet. Water consists of oxygen united with hydrogen. Give other examples of the importance of oxygen and its uses.

5 Write the properties of oxygen gas in the following chart :



Lesson Two (3 -2)

Carbon Dioxide

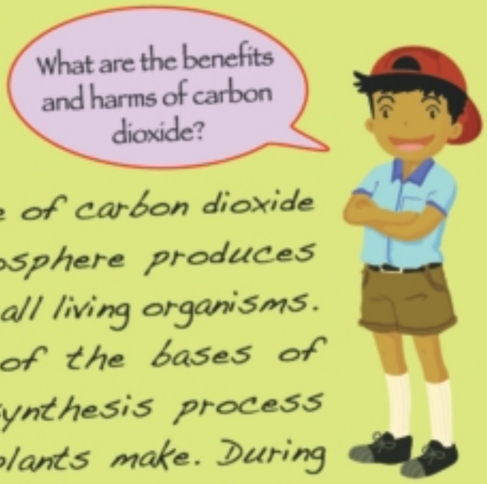
Objectives

By the end of this lesson, you should be able to:

- Identify sources of carbon dioxide emission.
- Do experiments illustrating the properties of carbon dioxide.
- Determine the importance and the uses of carbon dioxide.

Basic concepts

- **Carbon dioxide**



The presence of carbon dioxide in the atmosphere produces benefits for all living organisms. It is one of the bases of the photosynthesis process that green plants make. During this process, plants make the nutrients for living organisms. On the other hand, the increase of the percentage of carbon dioxide in the air leads to the suffocation of living organisms as well as global warming.

Green plants share in decreasing ratio of carbon dioxide in the atmosphere

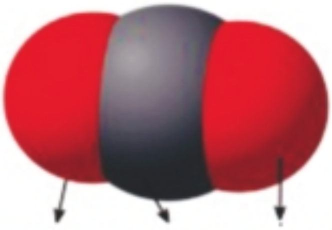


Fig (3–14) *A model of a carbon dioxide molecule*

Carbon dioxide is a chemical compound found in the form of a gas in its natural state in the atmosphere by a slight percentage 0.03%.

Its molecule consists of one carbon atom linked with two oxygen atoms. It has the symbol of CO_2 (figure 3-14).

Despite the fact that carbon dioxide is very important in the photosynthesis process of plants in order to build their bodies and compose food for all other living organisms, the increase of its percentage causes severe harms to the Earth's climate and raises its temperature.

Fig (3–15) *Plants absorb carbon dioxide*

Carbon dioxide resources:

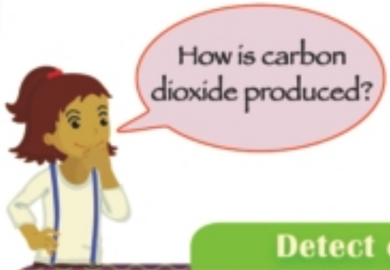
Carbon dioxide is emitted as a result of the combustion of organic materials such as:

- Wood
- Coal
- Oil
- Gasoline
- Tobacco (The material cigarettes are made of).

In recent years, it has been observed that the percentage of this gas in the atmosphere is rising. This is due to the burning of massive amounts of fuel in industrial plants and means of transportation engines.This beside to decreasing of green area and removal dorests.

Fig (3–16) *Carbon dioxide is emitted from industrial plants*

Carbon Dioxide



Carbon dioxide results from respiration of living organisms and combustion of organic substances. How can we detect the carbon dioxide inside these substances?

Activity
Detect carbon dioxide in the exhaled air

- **What do you need?** A jar or test tubes, clear limewater, a long juice straw)
- **What should you do?**
  - Pour some of limewater in the jar.
  - Blow in limewater for two minutes by using straw.
- **What do you observe?** ....

Fig (3–17) *Exhalation air contains CO_2*

Activity
Detect carbon dioxide during the plants' respiration

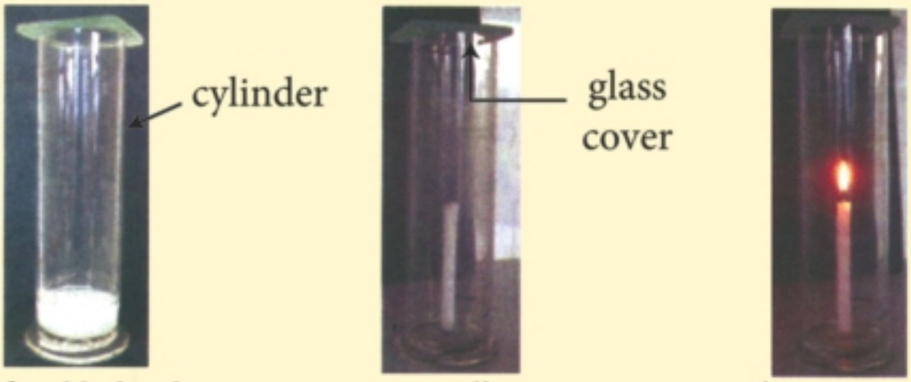
- **What to you need?** bean or pea seeds, a jar or test tubes, clear limewater, a plastic tube, clay, cotton, water.
- **What should you do?**
  - Proved some seeds of plants such as beans or peas in a jar on cotton or sawdust wet.
  - Make a hole in the jar cover and insert a plastic tube through it. Fix it carefully using the clay as shown in figure (3 - 18).
  - Insert the other end of the tube in a jar of clear limewater and leave it for a several days . Observe the change in the limewater.
- **What do you observe?** ....

Fig (3–18) *during the respiration of germinated Seeds carbon dioxide is produced .*

Activity

Detect carbon dioxide during a candle burning

◉ **What do you need?** A cylinder, a candle, clear limewater and glass cover.



a fixed lighted candle in cylinder — candle extinguishes — lime water is turbid

Fig (3-19) Carbon dioxide is produced during a candle burning

◉ **What should you do?**

- Fix a candle into a cylinder and light it .
- Cover the candle with a glass cover and observe it until the candle extinguishes.
- Remove the cover and pour a little of clear limewater inside the cylinder.

◉ **What do you observe?** ....

....

***From the previous activities, we can canclude that:**

- **Carbon dioxide is produced from the respiration of humans (the exhaled air) and respiration of out growth plants . It is also produced from the combustion of organic substances. It turbids the clear limewater (calcium hyaroxide) where white precipitate appears as a result of its reaction with carbon dioxide forming calcium carbonate, which don't dissolved in water.**
- **Turbidity of lime water is considered as detection of presence of carbon dioxide.**

Carbon Dioxide

Expermints show the proprties of carbon dioxide:

to identify the properties of carbon dioxide you need to prepare many cylinders of it.

Activity

Preparing carbon dioxide gas and discovering its propeties

◉ **What do you need?** Glass cylinders, glass flask with a stopper of two holes, a long funnel, diluted hydrochloric acid, calcium carbonate, a shaped U-shaped glass tube.

◉ **What should you do?**

- Canfigure the apparatus. shown in Figure (3 - 20).
- Pour a little acid on the calcium carbonate.
- Collect a set of cylinders filled with carbon dioxide by displacing the air upward.

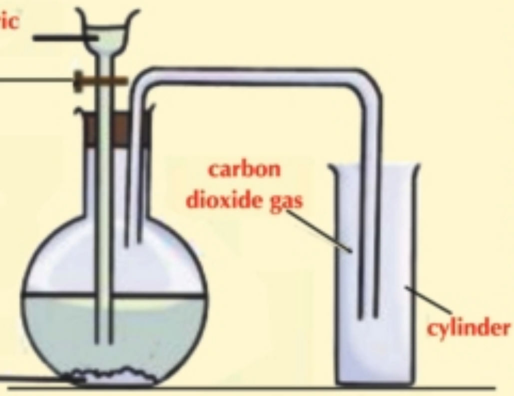


Fig (3–20) *Preparation of Carbon dioxide*

◉ **Use the cylinders (filled with carbon dioxide) to do the following experiments so as to identify its properties**

1. Turn a cylinder filled with CO_2 upside down on a lighted candle. Record your observations and explain them (Figure 3-21) ....
2. Through the activity of preparing carbon dioxide, you may have observed that it is collected by displacing the air upwards (Figure 3-20) What can you conclude? ....
3. Insert a lighted match stick in a cylinder filled with CO_2. what do you observe ? ....
4. Insert a lighted magnesium ribbon in a cylinder filled with CO_2 What do you observe? ....
5. Squeeze half a lemon on a little of sodium bicarbonate in a glass or open a soft drink bottle. Observe the color of the evolving carbon dioxide and identify its smell. Record your observations and explain them ....

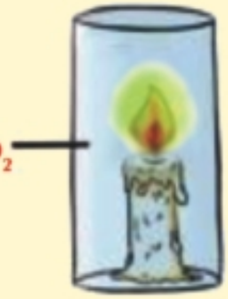


Fig (3–21) *the candle extinguishes in CO_2.*

★ Through the previous activities, we can determine the properties of carbon dioxide:

- **It is colorless and odorless.**
- **It is heavier than the air and so it is collected by displacing the air upward and replacing it.**
- **It easily dissolves in water, so it is not collected by displacing water as in preparing oxygen.**
- **It does not burn and does not help in combustion. So, it is used for extinguishing fires.**
- **The magnesium ribbon keeps burning and turns into a magnesium oxide (with white color) and the carbon (coal) deposits on the wall of the cylinder.**

Enriching information

Man gets suffocated if he breathes carbon dioxide. It is called the silent killer because we can not see it, taste it or even smell it. Breathing in a closed space with no or bad ventilation leads to a gradual decrease in oxygen and an increase in carbon dioxide. Quickly, everyone gets suffocated and loses consciousness and then dies.

Importance and uses of carbon dioxide: it is used in:

- Refrigeration on converting it into a liquid by pressure and cooling. Then, pressure is relieved composing dry ice that we use in refrigeration.
- It is used in extinguishing some types of fires because it does not burn and does not help in burning.
- It is used to make soft drinks.
- It is used to make bread bubbled as yeast which produces carbon dioxide by fermentation when it is added. Carbon dioxide gets expanded due to the heat making bread porous and tasty.
- Carbon dioxide contributes in the photosynthesis process in green plants leading to the production of food as well as the production of oxygen.

Life application

Carbon dioxide is a key component in the manufacture of soda water. Drinking too much of it is unhealthy. Scientists call it the useless food because it does not contain any nutrients except sugar.

When you have soft drinks, you swallow amounts of carbon dioxide. and increase these quantities cause osteoporosis and may cause death because of the high ratio of carbon dioxide in the blood, which lead to not getting the oxygen needed for vital body process .

Fig (3–22) ***Fire extinguisher generates, Carbon dioxiode used in extinguishing fires***

Carbon Dioxide

Exercises

1 What happens to our lives on earth if:

a The percentage of carbon dioxide in the air increases.

b The percentage of carbon dioxide in the air decreases.

2 Complete the following statements:

a In photosynthesis process, the plant absorbs .... gas and produces .... gas while in respiration process, ... gas in consumed and .... gas is produced.

b True ratio of carbon dioxide gas in atmospheric air is .... and .... has the symbole of ....

c Carbon dioxide gas is changed by .... and .... to liquid then pressure is relieved composing .... which use in refrigeration.

3 Justify:

a. Carbon dioxide is used in extinguishing fires.

b. Yeast is added to the dough on making bread.

c. Clear limewater becomes turbid when carbon dioxide passes in it .

d. The environment suffer from increasing the ratio of carbon dioxide gas in recent years.

UNIT 3

Lesson Three (3 -3)

Nitrogen

Objectives

By the end of this lesson, you should be able to:

- Identify the properties of nitrogen.
- Identify the importance of nitrogen.

Basic concepts

- Nitrogen
- Properties of nitrogen
- The importance of nitrogen

Nitrogen [redacted]:

It is a chemical element found in nature in the form of a gas and referred to by the symbol N_2 as the nitrogen molecule consists of two atoms of nitrogen.

Nitrogen is also called azote which means (lifeless) because it does not help in burning

It is a colorless, tasteless and odorless gas and hardly dissolves in water. It is a main component in all proteins.

Daniel Rutherford, discoverer of nitrogen

The existence of nitrogen

Nitrogen represents 78% of the Earth's atmosphere and contributes in the composition of all living tissues in all living organisms. They need nitrogen to live as nitrogen composes the most important part in protein.

Nitrogen oxides are formed in the atomsphere during lightening (fig. 3-23) which reaches soil with rain water. Legumes such as clover, peas and soybeans produce proteins from atmospheric nitrogen by the help of a specific type of bacteria that live in their roots.

Fig (3–23) *Oxygen reacts with nitrogen in the event of lightning composing compounds known as nitrogen dioxides.*

Activity
Preparation of nitrogen in the laboratory

What do you need? Concentrated sodium or potassium hydroxide, glass flask, a hot copper, glass basin, a glass cylinder, water connecting tubes.

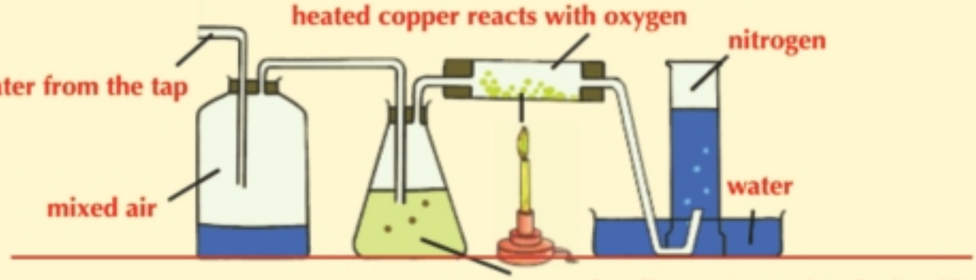


Fig (3–24) *preparation of nitrogen from air*

What should you do?

- Make an apparatus used for the preparation of nitrogen as in figure (3-24).
- Open the water tap to push the air inside the first flask. Air passes through the solution of concentrated sodium or potassium hydroxide to absorb small amounts of carbon dioxide from the air.
- Let the air pass over the hot copper to combine with oxygen formed in the air.
- Collect the produced gas (nitrogen) through the displacement of water downward.
- Record your observations about its solubility in water ....
- Fill some cylinders to do activities so as to identify the properties of nitrogen.

Nitrogen

Properties of nitrogen:

◉ Do the following activities to identify properties of nitrogen:

1. Notice the color, taste and smell of nitrogen in one of the cylinders that you filled with nitrogen while preparing it. (Figure 3-24). Record your observations: ....
2. You have may noticed during nitrogen preparation that it is collected by the displacement of water downward . Also, it does not react with hot copper as what happened with oxygen. Discuss this with your colleagues. Explain: ....
3. Place a match close to the gas rising from the cylinder then record you observations: ....
4. Notice your teacher while lighting a ribbon of magnesium and putting it in the cylinder filled with nitrogen. Record your observations: ....
5. Notice the smell of gas rising as a result of the magnesium burning in nitrogen. and adding a little amount of water to it. Record your observations: ....

Amusing information

You can fix a nail in a piece of wood by a banana. If quickly immersed in liquified nitrogen, it will freeze quickly and become solid. Therefore, liquified nitrogen is used in the rapid cooling of food, medicines and vaccines which are spoiled by heat.

▲ Liquified nitrogen is used for cooling

We can identify the most important properties of nitrogen as follows:

- ◉ Nitrogen is a colorless, tasteless and odorless gas.
- ◉ It scarcely dissolves in water and doesn't react with another elements easily.
- ◉ It does not help in burning.
- ◉ When it combines with a lighted magnesium ribbon composing a white substance. By adding a little water, a very pungent smell "ammonia" emits. (figure 3-25).
- ◉ Nitrogen can be condensed to a liquified state.

Fig (3 –25) *the burning of magnesium in nitrogen*

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The importance and uses of nitrogen:

- Nitrogen is recently used in filling car tires for the relative constancy of its volume at the change of temperature. (Figure26)
- Small amounts of nitrogen are used to fill some types of lamps.
- Nitrogen is used to make stainless steel.
- It contributes in composing gunpowder and ammonium nitrates included in the composition of soil fertilizers.
- It is commercially used in the manufacture of ammonia to produce fertilizers (figure 3-27).
- Nitrogen is used as an inactive material in the tanks of liquified explosives such as: Petroleum, some flammable materials and during the manufacture of electronic devices.
- Liquid nitrogen is used in:
  1. Treatment to skin tumors.
  2. Cooling food products with the aim of preservation or transferring purposes.

Fig (3–26) *Nitrogen is used in filling tires.*

Fig (3–27) *Fertilizers*

Nitrogen

Exercises

1 Write (✔) in front of the correct statements and (✘) in front of the false ones: and correct the false one :

a. Nitrogen gas reacts easily with other elements. ( )

b. Legumes such as clover benefit from the nitrogen in the air. ( )

c. Nitrogen gas is also called azote which means life gas. ( )

d. Ozone gas is used in the tanks of liquefied explosives and flammable materials. ( )

e. Oxygen gas is colorless, tasteless, odorless and does not help in burning .

2 Justify:

a. Nitrogen is recently used in filling car tires.

b. Liquified nitrogen is used for cooling food products and medicines.

c. The main source of nitrogen is the air.

d. We prepare nitrogen by passing air across the sodium hydroxide or potassium.

e. Nitrogen contributes in the composition of all living tissues.

3 Explain how you get:

a Nitrogen gas from the air.

b Ammonia from nitrogen gas .

Unit (3) Test

Unit (3) Test

1 Put (✔) in front of the correct statements and (✘) in front of the false ones and correct the false ones :-

a. The nodular bacteria fix oxygen of air in the roots of leguminous plants such as beans and clover. ( )

b. Oxygen gas occupies 78% of the atmospheric air componets. ( )

2 Justify;

a. Nitrogen is used to store petroleum and some flammable materials.

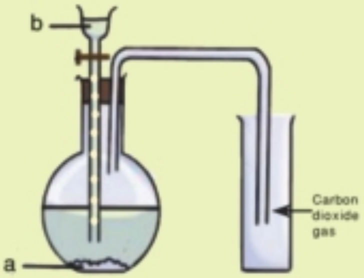
b. The clear limewater is used in detection of carbon dioxide gas .

3 Explain how you get :

a. Oxygen gas from hydrogen proxide .

b. Carbon dioxide gas from wood .

4 **Look at the opposite figure, then answer**



1- Write what represents each label on figure:
- Substance (a): ....
- Liquid (b): ....

2 - Mention the uses of carbon dioxide gas:
1 - ....
2 - ....
3 - ....

Unit 4

Structure and Function

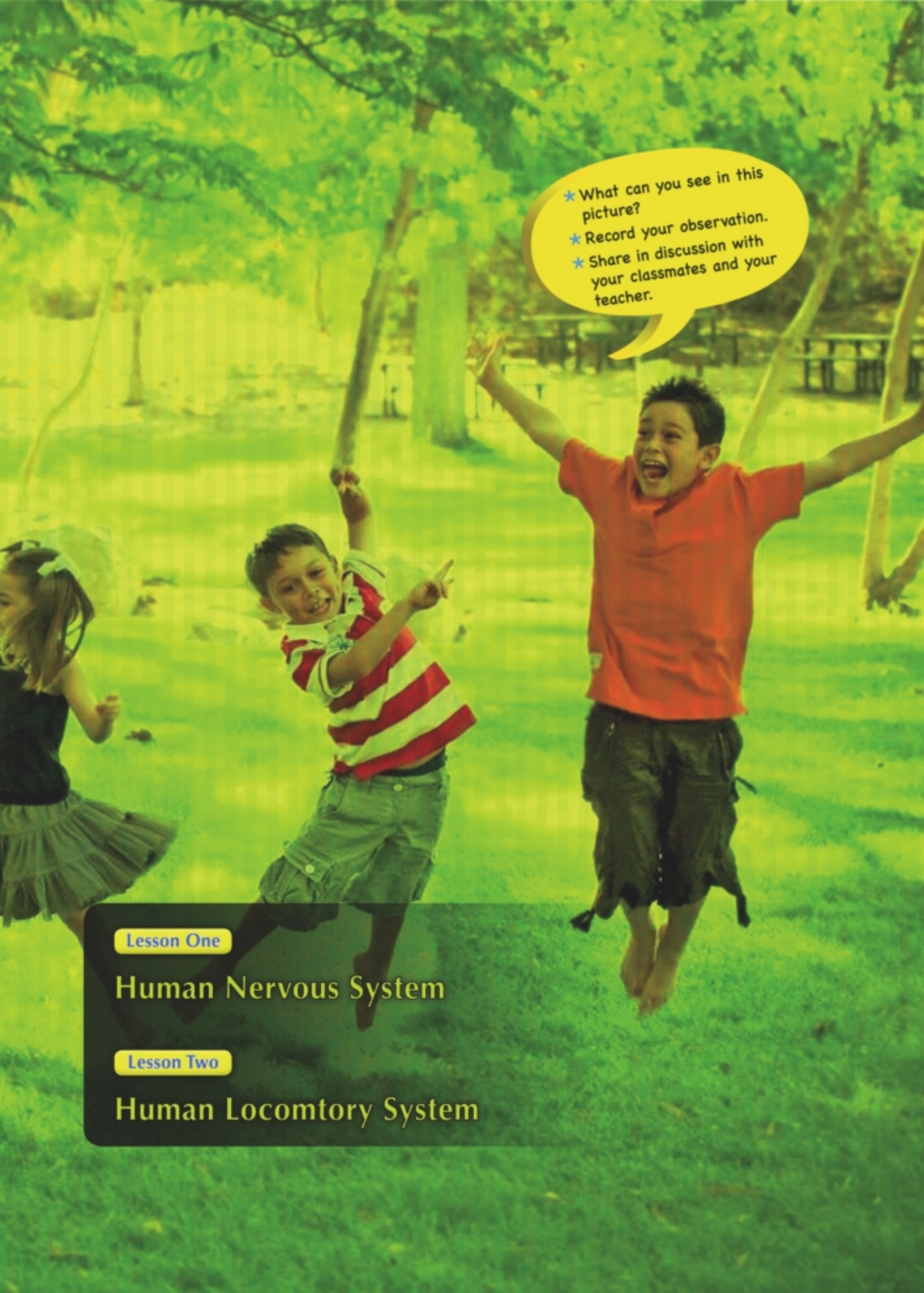
Unit Objectives

By the end of this unit, you should be able to:

- **Identify the structure and functions of the human nervous system.**
- **Explain the occurrence of reflex action.**
- **Identify the importance of the human nervous system and ways of maintaining it.**
- **Identify the structure of the human locomotory system.**
- **Explain the importance of muscles and joints for movement.**
- **Identify some ways to maintain the locomotory system.**

Unit introduction

This unit deals with the structure and function of nervous and locomotory systems in your body. It also deals with the ways of maintainance of both systems and their importance for your health.



Lesson One

Human Nervous System

Lesson Two

Human Locomtory System

UNIT 4

Lesson One (4 -1)

Human nervous System

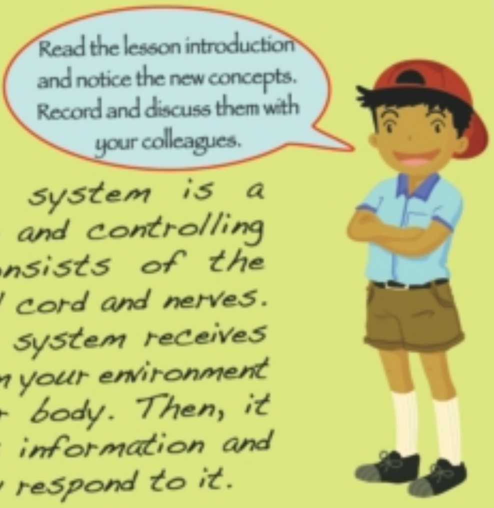
Objectives

By the end of this lesson, you should be able to:

- Identify the structure and functions of the human nervous system.
- Explain the occurrence of reflex action.
- Identify the importance of the human nervous system and ways of maintaining it.

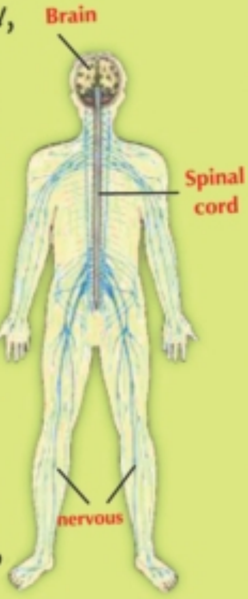
Basic concepts

- Brain
- Spinal cord
- Reflex action



Your nervous system is a communication and controlling device. It consists of the brain, the spinal cord and nerves. This important system receives information from your environment and from your body. Then, it interprets this information and makes the body respond to it.

Your nervous system lets you know if things are hot, cold, sweet, bitter, rough or smooth. It adjusts your movements, protects you from harm, makes you feel pain, makes you solve problems and learn music.



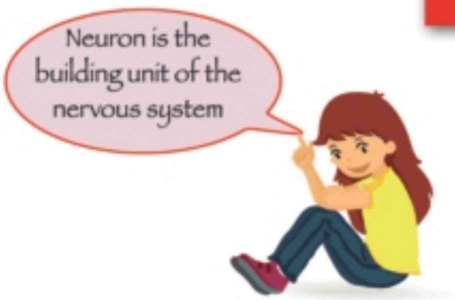
In addition, the nervous system adjusts the responses that require emotions. It makes you happy, sad, angry or calm.

It oversees the multiple functions performed by the human body such as moving, feeding, digestion, breathing, thinking and others. Then, it coordinates and regulates them.

Structure and functions of the human nervous system:

The nervous system consists of two major systems:

- The central nervous system.
- The peripheral nervous system.



Activity

What are the components of Neuron?

What do you need?

A microscope, a slide of neuron

What should you do?

- Examine a slide of neuron by a microscope.
- What do you observe? ....
- The neuron consists of two main parts:
  - The cell body – the axon

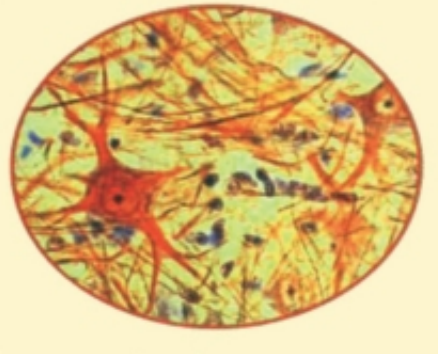


Fig (4–1): *The neuron under microscope*

1 Cell body:

- It contains a nucleus, cytoplasm and a plasma membrane.
- There are some branches extending from the neuron's body called dendrites connected to neighboring neurons composing the synapse.

2 The axon:

- It is a cylindrical axis covered with a fatty layer called myelin sheath. The axon ends with nerve endings (Axon terminals) connected to muscles or form a synapse with other neurons (See Figure 4 – 2).

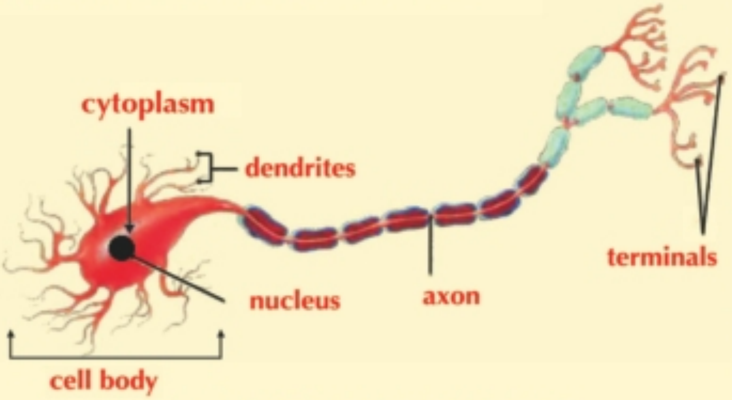


Fig (4–2): *The structure of a neuron*

Human nervous System

First: The central nervous system

The system is composed of:

- The brain
- The spinal cord

1 The brain:

It is the main control center in your body. It directs and coordinates all the processes, ideas, behaviors and emotions.

The brain is located inside a bony box called the skull that works to protect it. It is a nerve block containing millions of nerve cells.

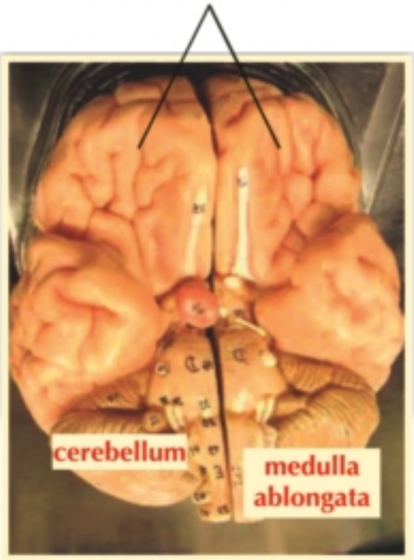


Fig (4–3): *Structure of the brain*

- Observe Fig (4-3) which illustrates the structure of the brain. It consists of:
  1. Cerebrum
  2. Cerebellum
  3. Medulla ablongata

Activity

Examine the sheep's brain

What do you need?

Fresh sheep's brain - dissecting tools (forceps - dissecting needle - scalpel).

What should you do?

- Examine the sheep's brain and identify its main parts.
- Make a longitudinal cutting through the hemispheres using the scalpel.
- Notice the difference in the color inside and outside the brain.

Fig (4–4): *A sheep's brain*

Record your observations: ....

....

① Cerebrum:

It is the largest part of the brain. It consists of two halves separated by a fissure and attached to each other through a nerve fibres which are responsible for cannection between them. The outer surface of the hemispheres is called cerebral cortex and it is gray. The hemispheres are characterized by having many convolutions and folds on their surface.

Fig (4–5): *the brain's hemispheres.*

The most important functions of the hemispheres are:

- Controlling the voluntary movements of the body such as walking, setting and running in races.
- Receiving nerve impulses from sense organs (eyes, ears, nose, tongue and skin) and send appropriate responses to these impulses.
- Contain the centers of thinking and memory.

Do you know?

- The adult human brain weighs about 1.5 kg. Some people believe that if the human brain gets bigger the intelligence will increase. But this is not true, all adults have an equal brain sizes.

② Cerebellum:

Cerebellum lies at the back area of the brain below two hemispheres.

Its most important functions are:

- Maintaining the balance of the body during movement.

③ The medulla oblongata:

The medulla oblongata is located in front of the cerebellum. It connects the brain with the spinal cord. Its function is regulating the involuntary processes of the body as:

- Regulating heart beats.
- Regulating the movement of the respiratory system parts during breathing.
- Regulating the movements and functions of the digestive system.

2 Spinal cord:

The spinal cord extends in a channel within a series of vertebrae in the backbone. It is cylindrical and the spinal nerves extend from it.

Fig (4–6): *Structure of the spinal cord*

Human nervous System

Activity

Examine a cross-section of the spinal cord

- **What do you need:** A microscope - ready made slide of the spinal cord.
- What should you do?
  - Examining the slide of the spinal cord by a microscope.
- Record your observations: ....
  - On examining a slide of the spinal cord, it is clear that the spinal cord consists of an internal substance that is the grey matter and it appears in the shape of letter H surrounded by the white matter.

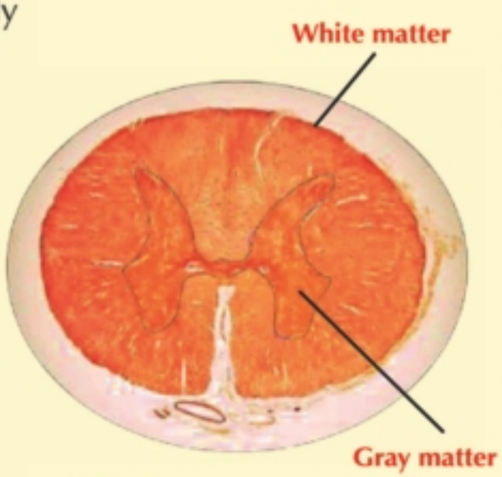


Fig (4 – 7): *Structure or spinal cord*

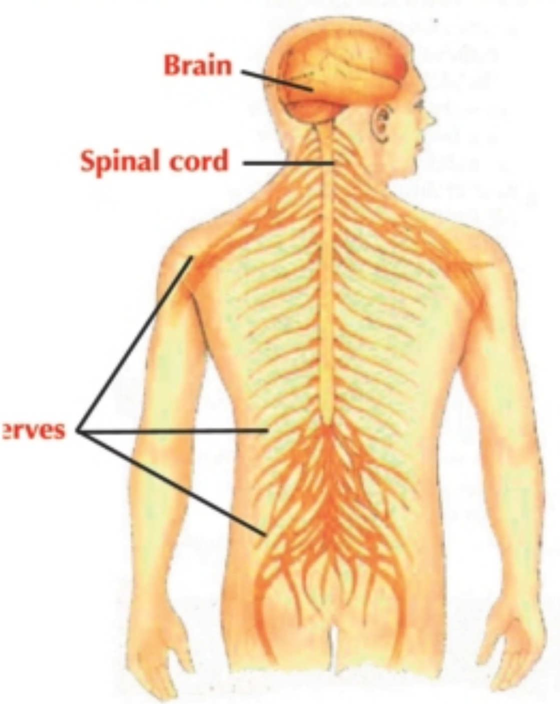


Fig (4 –8): *The peripheral nervous system*

Functions of the spinal cord:

1. It delivers nerve messages from body organs to brain and vice versa.
2. It is responsible for the reflexes such as the withdrawal of the hand quickly on touching a hot surface.

Second: The peripheral nervous system

It is the nerves which emerge from the central nervous system; i.e. the brain and the spinal cord. The function of these nerves is to get sensory information and kinetic responses between the central nervous system and all parts of the body. There are 12 pairs of nerves which emerge from the brain known as cranial nerves and 31 pairs of nerves emerge from the spinal cord known as spinal nerves.

Reflex action

When the body is subjected to an external stimuli such as light, heat, and smell, it makes an involuntary response by The nervous system. It is called the reflex action. Why does the withdrawal of a hand occur quickly upon touching plants' thorns or a hot surface?

Activity

Explanation of the reflex action

◉ **In this activity, trace the stages of the reflex action:**

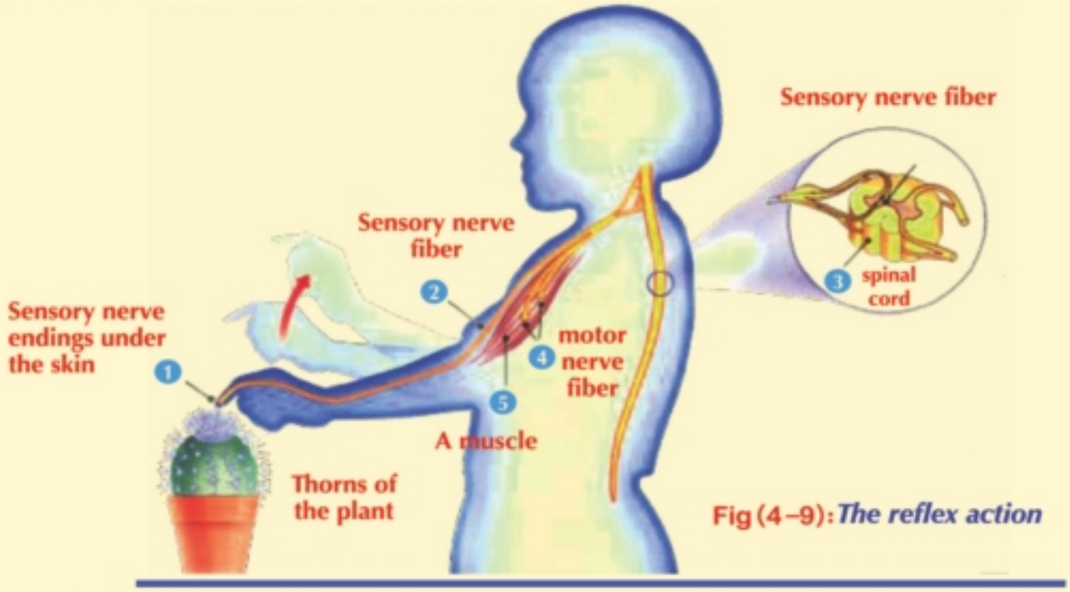


Fig (4–9): *The reflex action*

- The girl touched a plant with sharp thorns. She quickly picked up her hand. How did this occur?
- The severity of the thorns affects the nerve endings in the fingers resulting in nerve impulses.
- Nerve impulses are transmitted to the spinal cord through a sensory nerve fiber.
- Nerve impulses are transmitted from the spinal cord through a motor nerve fiber to arm muscles (without the brain's intervention). Muscles contract and the arm withdraws away from the thorns.
- Other nerve impulses are transmitted from the spinal cord to the sensory centers in the brain which leads to the true sense of pain.

◉ **What do you conclude?** ....

◉ **Explain:** What happens when you suddenly touch a hot object?

Examples of reflex action

- Withdrawing the hand quickly when it touches a hot surface.
- Blinking when something gets close to the eye.
- What are the other examples of the reflex actions that you know? ....

▲ The hand touches a hot thing

▲ A thing gets close to the eye

The importance of the human nervous system and ways of maintaining it.

Now, it is clear that nevous system has a special importance because its main function is to carry nerve messages from one of the areas of the body to another area. It works on regulating and coordinating all the vital processes within the body. It also receives the external stimuli that surround the human being through the sensory organs and identifies and interprets them.

Ways of maintaining the human nervous system:

- Reducing the intake of the stimulating substances such as coffee and others as they affect sleeping periods and heart beats and lead to nervous tension as well.
- Stay away from tranquilizers and stimulants.
- Not exhausting the sensory organs by sitting for long periods in front of the computer and television.
- Giving the body a sufficient period of rest especially during sleep.
- Avoiding extreme exciting situations.
- Staying away from sources of pollution because they passively affect the nervous system as noisy places and smoke emitted from exhausts of cars, factories, ...etc.
- Doing physical exercises.
- Staying away from addiction because it passively affect on the nervous system as :
  - Retardation of memory and learning.
  - Nervous tenstion.
  - Sluygishness.
  - Loss time sensation.
  - Sleepless.

▲ Reducing the intake of coffee

▲ Avoiding sitting for long periods in front of computer

▲ Staying away from sources of pollution.

Exercises

1 Choose the correct answer:

a) The number of cranial nerves is .... pairs of nerves.
1. 31 2. 21 3. 12

b) The grey matter in the spinal cord appears in the shape of letter ....
1. H 2. F 3. A

c) The cerebellum is responsible for ....
1. thinking process 2. the body's balance 3. the reflex action

d) One of the components of nerve cell is the presence of ....
1. Blood vessels 2. cover of myelin 3. dendrites

e) .... controls reflex actions
1. Spinal cord 2. Cerebellum 3. cerebrum

2 Write the scientific term for each of the following statements:

a) Automatic response of the body to different stimuli.

b) Part of the nervous system responsible for reflex actions.

c) The basic structure unit of the nervous system.

d) Linked to the brain through the spinal cord and is responsible for involuntary actions.

e) Consists of a grey matter in the form of H letter surrounded by the white matter.

3 Locate the following parts in the human body:

a) Cerebellum

b) Spinal cord

c) Hemispheres

d) Medulla oblangata

4 Mention the importance of:

a Medulla oblongata.

b Spinal cord.

c Skull.

d Cerebellum.

e The two hemispheres.

5 What happens when:

a Sitting for long times in front of the computer.

b Your finger gets pricked by plant thorns.

c Continuous exposure to contaminated air from factories' smoke.

d Approaching something to the eye.

6 Give reasons for each of the following:

a Damage of the medulla oblangata causes death.

b The brain is located inside the skull and the spinal cord extends through the inside of the backbone.

c It is important not to take sleeping pills without the doctor's prescription.

d Withdrawal of the hand quickly when it suddenly touches a hot surface.

Lesson Two (4 -2)

Human Locomotory System

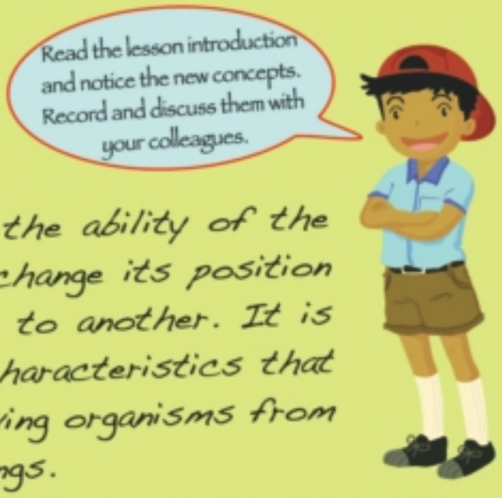
Objectives

By the end of this lesson, you should be able to:

- Identify the components of human locomotory system.
- Explain the importance of the muscles and joints to movement.
- Identify some ways to maintain the locomotory system.

Basic concepts

- Skeleton
- Joints
- Muscles



Movement is the ability of the organism to change its position from a place to another. It is one of the characteristics that distinguish living organisms from non-living things.

Movement is one of the most prominent life aspects in the human life. It helps man to move from one place to another seeking benefit or away from harm. Movement occurs with participation and integration of special organs and systems such as the skeletal, muscular, and nervous systems that regulate and coordinate the required movement.

Movement is one of the most promiment life aspects in the human life

The structure of human locomotory system:

Through the work of muscles and bones together, your body can move. Locomotory system consists of two major systems:

- The skeletal system
- The muscular system.

The skeletal system

- The human skeletal system consists of:
  - The axial skeleton
  - The appendicular skeleton

The axial skeleton

- The axial skeleton consists of the following parts:
  - The skull
  - Backbone
  - Rib cage
- Notice the parts in figure (4 - 10).

Fig (4–10): *The human skeleton.*

- **The skull:** is a bony box that contains cavities for the eyes, ears and nose. Its function is to protect the brain.
- **Backbone:** consists of 33 vertebrae with cartilages between them to prevent their friction during movement. The backbone function is to allow the body to bend in different directions and protect the spinal cord inside.
- **The rib cage:** consists of 12 pairs of ribs. The first ten pairs are connected anteriorly to the sternum (breastbone). The function of the rib cage is to protect the lungs and the heart, in addition to helping in the inhalation and exhalation processes.

Fig (4–11): *Bones of upper limbs.*

Fig (4–12): *Bones of lower limbs.*

Appendicular skeleton:

- It consists of the bones of upper and lower limbs.

1. **Bones of the upper limbs:** are connected to the shoulder bones
   - humerus bone, forearm bones and hand bones.
   - The function of the two upper limbs is to allow eating, drinking, writing and holding things.
2. **Bones of the lower limbs :** are connected to the pelvic (hip) bones
   - Femur, shaft bones and foot bones.
   - The function of the lower limbs is to allow walking, running, standing, sitting and carrying the rest of the body.

Joints and their significance to movement:

- Can a human move if all of his bones are fused together? (yes/no).
- Identify the locations where bones meet in the body by joints. All the joints of the body allow the movement between the bones.

- **Joints are three types:**

1. **Immovable joints:** such as the joints between the bones of the skull. They do not allow any movement.
2. **Slightly movable joints:** they allow movement in one direction only such as the knee and elbow joints.
3. **Freely movable joints:** they allow movement in all directions such as the shoulder, thigh joints wrist in hand and ankle in foot.

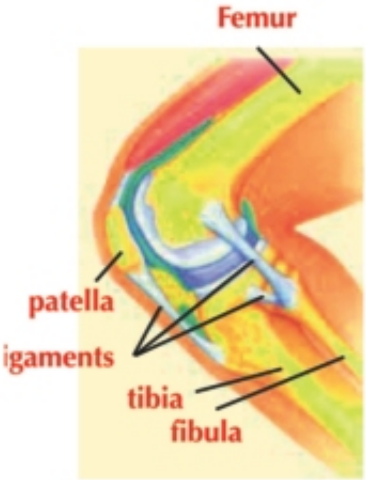


Fig (4–13): *Slightly movable joint*

Human Locomotory System

Activity

What type of movement do joints perform?

◉ **Notice the movement of the body of this player and determine:**

- The types of different joints

  ....
  ....
  ....

- How to perform the movement especially in the places referred to by arrows

  ....
  ....
  ....
  ....

Fig (4–14): *A basket ball player*

The role of the muscles in performing movement

Our muscular system is considered the engine of our body. Muscles generate mechanical energy and movement to the body. Movement is generated by the ability of muscular cells to contract and relax.

Muscles are fixed to bones by long strips called tendons.

You may be able to move your muscles willingly such as the limbs trunk, face and abdominal wall muscles. They are called the voluntary muscles.

There are other types of muscles that work automatically and you can not control or even be aware of their movements such as The gastrointestinal tract, The blood vessels and The bladder muscles. They are called involuntary muscles.

Do you know?

- The human body contains 650 muscles. The biggest muscle size is at the bottom of the body while the smallest is in the ear.
- Humans use 200 muscles during walking.

Activity

The role of muscles in the movement of the hand wrist

What should you do?

- Notice the two figures (a - b) which muscles contract and which relax in both cases? ....
- Which muscles move in contracting and relaxing? ....
- What is the function of the joint in bending and extending the arm? ....
- How are the muscles linked to bones? ....

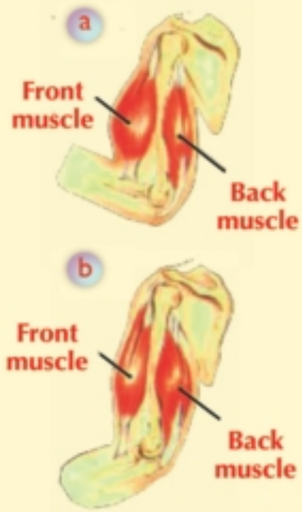


Fig (4–15): *The arm in many positions.*

How can you maintain your locomotory system?

- Commitment on vaccinating children according to Ministry of Health's instructions as well as giving children polio vaccinations at accurate times.
- Eating healthy food rich in calcium, phosphorus and vitamin D to prevent bone diseases such as Osteomalacia and rickets.
- Avoiding any behavior that leads to fractures and sprains such as jumping from high places and making violent movements.
- Avoid carrying heavy things that exceed your ability to protect the skeleton, especially your backbone.
- Sitting and standing correctly during studying or reading to avoid straining the neck or backbone vertebrae.
- Exposing the body to sunlight for suitable periods due to its importance in providing the body with vitamin D.
- Exercising regularly.
- Avoid muscle stress by setting on one side for a long lime.

▲ A healthy food rich in calcium

▲ Do not carry heavy objects

Exercises

1 Write the scientific term for each of the following statements:

a Structure which consists of the skull, backbone and rib cage.

b Axis of the skeleton in the human body.

c What fixes muscles to bones.

d The type of skeleton which includes the bones of upper and the lower limbs.

e Two bones meeting area.

2 Determine the type of the following joints:

a The knee joint

b Elbow joint

c Shoulder joint

3 The following figure shows the arm in two different cases:

a Write the names of the bones and the muscles on the figure in the two different cases.

b Describe what happens to the muscles during each case .

1

2

4 What happens if:

a Thigh joint has a limited movement.

b The front arm muscle relaxes and the back arm muscle contracts.

5 How can you maintain your locomotory system?

6 Put (✔) in front of the correct statements and (✘) in the front of false one, and correct the false ones:

a The skeleton of lower limb consists of humerus bone, 2 forearm bones and bones of the hand. (   )

b Knee joint is a freely movable joint. (   )

c Shoulder joint is an immovable joint. (   )

d Joints link bones with muscles. (   )

e Tendons are the sites of bones meeting. (   )

Making models

- Use simple environmental materials (coloring pencils - clay - a wooden board - paper cardboard ...) to make a model of the nervous system. Present it in the science laboratory or school gallery.

Life issues

- You studied the importance of maintaining the nervous system and you know that the drug spreading among young people and individuals is a dangerous phenomenon that leads to the destruction of the health of the addictive person, especially the nervous system. Discuss this topic in an article on the school radio pointing out the risks reflected on the individual and society as a result of addiction and its negative effects on public health and the health of the nervous system.

Healthy issue

- The human body requires practicing sports activities to maintain the locomotory system. Visit a gym to identify different mechanisms that can be trained in order to strengthen the skeletal system and muscles.

Research activity

- You learned that the human movement is coordinated by two basic systems: the skeletal system and the muscular system. These two systems need to be maintained. Discuss the importance of this in a two-page research supported by pictures using the school library and the internet. Attach your work to your portfolio.

Unit (4) Test

Unit (4) Test

1 Choose the correct answer:

a. Myelin sheath surrounds the ....
   1. nerve cell axon.
   2. cerebellum.
   3. spinal cord.

b. Reflex action takes place through the ....
   1. medulla oblongata.
   2. cerebral hemispheres.
   3. spinal cord.

c. The joint is the location of meeting of ....
   1. two bones.
   2. a muscle with a bone.
   3. two muscles.

d. .... are fixed muscles with bones.
   1. Tendons.
   2. Joints.
   3. Muscle fibres.

e. Skulls joints are ....
   1. immovable.
   2. slightly movable.
   3. free movable.

2 Give the scientific term for each of the following statements:

a. The building unit of nervous system.

b. The organ which consists of an internal H-shaped grey matter surrounded with a white matter.

c. The autonomic body response towards different stimuli.

d. The skeleton which includes the upper and lower limbs.

3 Mention the location of the following parts in human body:

a Medulla oblongata.

b The H-shaped grey matter.

c The cerebellum.

d The spinal cord.

4 State the importance of each of the following:

a Tendons.

b Cerebellum.

c Joints.

d Cerebral hemispheres.

e Rib cage.

5 Give reasons:

a The rapid withdrawal of the hand on sudden touching thorns of a plant.

b Muscles play an important role in human movement.

c Damage of medulla oblongata may lead to death.

General questions on science – first term

Exercise (1)

First Question:

- Choose the correct answer:

1. The mass of a body on the moon surface is 10 kgm so its mass on earth surface equals:
   - a) 10 kgm.
   - b) 10 Newton.
   - c) 60 kgm.
   - d) 60 Newton.

2. From the tools of measuring weight:
   - a) Sensetive scale.
   - b) double pans scale.
   - c) Digital scale.
   - d) spring scale.

3. The weight of a body its mass 200 gm on earth surface nearly equals:
   - a) 2 Newton.
   - b) 20 Newton.
   - c) 200 Newton.
   - d) 2000 Newton.

4. The Newton is nearly equals weight of a body its mass:
   - a) 10 gm.
   - b) 100 gms.
   - c) 1000 gms.
   - d) 10000 gms.

5. The mass of half liter of water equals:
   - a) 5 gms.
   - b) 50 gms.
   - c) 500 gms.
   - d) 5000 gms.

6. The weight of a person in a balloon at certain height from earth surface equals 70 Newton, what is the weight of the person on earth surface?
   - a) 68 Newton.
   - b) 69 Newton.
   - c) 70 Newton.
   - d) 71 Newton.

7. Which of the following is faster in conducting heat?
   - a) aluminum.
   - b) iron.
   - c) copper.
   - d) glass.

8. From the substances which are bad conductor of heat:
   - a) iron and aluminum.
   - b) copper and glass
   - c) glass and wood.
   - d) aluminum and copper.

9 The operation of thermometer depends on the idea of:

a The change of gases volume with the change in temperature.

b The change of liquids volume with the change in temperature.

c The change of gases mass with the change in temperature.

d The change of liquid mass with the change in temperature.

10 The clinical thermometer is different from Celsius thermometer in:

a The type of matter present in the reservoir

b The presence of constriction in the capillary tube

c The type of matter used in manufacturing

d The effect of change temperature on the present liquid volume

11 All the following from the properties of mercury as themometrical substance except:

a good conductor of heat.

b its expansion is regular.

c give limited extent to measure the temperature.

d not adhere to the walls of capillary tube.

12 Which of the following gases have great percentage in atmospheric air:

a oxygen.

b nitrogen.

c carbon dioxide.

d water vapour.

13 Oxygen is present in the atmosphere in gas state in form of molecules ,its structure:

a O.

b O_2.

c O_3.

d O_4.

14 Respiration and combustion processes consume ……….. gas:

a oxygen.

b nitrogen.

c argon.

d carbon dioxide.

15 Hydrogen peroxide decomposes in presence of manganese dioxide to:

a oxygen and hydrogen.

b oxygen and water.

c hydrogen and water.

d hydrogen and manganese.

General questions on science _ first term

16. **When a glowing magnesium ribbon is placed in a gar contains nitrogen gas then adding a little of water .... gas evolves:**

a oxygen. b nitrogen.
c ammonia. d hydrogen.

17. **Which of the following can be obtained on adding dilute hydrochloric acid to calcium carbonate powder?**

a nitrogen. b oxygen.
c hydrogen. d carbon dioxide.

18. **All the following are from the constituents of the brain except:**

a two cerebral hemispheres. b cerebellum.
c medulla oblongata. d spinal cord.

19. **Which of the following is responsible for keeping the body balance?**

a medulla oblongata. b two cerebral hemispheres.
c spinal cord. d cerebellum.

20. **Medulla oblongata is responsible for:**

a controlling the voluntary movement. b keeping the body balance.
c controlling the involuntary processes. d reflex action.

21. **Which of the following joints is limited movement?**

a shoulder. b wrist.
c thigh. d elbow.

Second question:

1. A piece of rock is placed in a pan of double pans scale, the sum of masses which are placed in the other pan is 300 gm to make balance.

- **Answer the following:**

a What is the mass of the piece of rock? What the direction of the effect of this mass?

b What is the weight of the piece of rock? What the direction of the effect of this weight?

c What is the effect of changing the place on both mass and weight of the rock piece?

2 Mention one function for each of the following:

a. Skull.
b. Theoretic cage.
c. The two cerebral hemispheres.
d. Spinal cord.
e. The vertebral column.

3 Explain the following:

a. In the clinical thermometer there is a constriction in the capillary tube above mercury reservoir.
b. The clinical thermometer is not used to measure boiling point of water.
c. The mercury is used in manufacture of thermometers.
d. Ozone layer has great importance in the life of creatures on the earth Surface.
e. A white precipitate is formed when carbon dioxide gas passed in clear lime water.
f. Nitrogen is used in filling cars and airplanes' tires.

4 What would happen in the following cases?

a. Nitrogen is not present in the atmospheric air.
b. The percentage of carbon dioxide gas increases in the atmospheric air.
c. There are no joints in the skeleton.
d. The knee joint becomes from wide movement joints.
e. Continuous exposing to the noise.
f. The over use of stimulation drugs.

5 How to obtain:

a. Nitrogen from atmospheric air.
b. Carbon dioxide from calcium carbonate.
c. Oxygen from hydrogen peroxide.

Exercise (2)

First question: Complete the following statements:

1. The peripheral nervous system consists of .... and .... nerves.
2. The axon of nerve cell is surround by .... sheath.
3. The brain consists of ....,................. and ....
4. The over intake of tea and coffee causes ....and ....

Second question: Choose the correct answer from the following:

1. The outer surface of the two cerebral hemispheres is called cerebral cortex and its colour is:

   a) red   b) orange   c) black   d) gray

2. .... are from the reflex actions:

   a) Heart beats.
   b) The eye close on approaching an external body .
   c) Eating when we are hungry.
   d) All the previous are correct.

3. The five sensation centers are in:

   a) Two cerebral hemispheres   b) cerebellum
   c) Medulla oblongata   d) brain

Third question: Give reasons for the following:

1. The weight of any body is different as the planets differ.
2. The handles of cooking pots are made of wood or plastic while the cooking pots are made of aluminum.
3. The clinical thermometer is used in measuring human body temperature while it is not suitable for measuring the liquid temperature .
4. Mercury is used in clinical thermometer .
5. Oxygen is collected by down displacement of water .
6. Divers use oxygen cylinders during diving in water.
7. Oxygen ratio still constant in atmospheric air although a large part of it is consumed during respiration and combustion processes .
8. Carbon dioxide gas has great vital importance in life continuity on earth surface
9. Nitrogen gas is important for our life .

Fourth question: Compare between each of the following:

1. Mass and weight .
2. Clinical thermometer and Celsius thermometer.
3. Bad heat conductor substances and good heat conductor substances .
4. Oxygen gas and carbon dioxide gas from the point of properties of each .

Fifth question: What would happen in the following cases?

1. Your knee collide a hard body .
2. Taking drugs.
3. The over intake tea and coffee especially during days of exams .

Sixth question: What is the role of the following ?

1. Muscles in making movements.
2. Manganese dioxide in preparing oxygen gas .
3. Mercury in thermometers .
4. The nerve cell in the human body .

Exercise (3)

First question: **Complete the following statements:**

1. The mass is measured by ……… unit while the weight is measured by ……..unit
2. The factors affect the weight of the body depend on ………..,………. and………
3. The weight of the body on moon surface equals ……….. of its weight on earth´s surface.
4. The weight of the body on earth's surface increases as the ………. increases
5. As the mass of the planet on which the body exits, the ……. of the planet increases and ………. of the body increases .
6. The weight is …………………………………………
7. The heat is a form of the forms of …………….
8. The temperature considers as indicator help us to express ………. and ………… of the body .
9. The good conductor substances of heat are the substances which ……… as ……………..
10. The bad conductor substances of heat are the substances which ……… as …………

11. The heat is used in industry and preparing of ………………..
12. The main idea of thermometer action is the change of the ……….. of the liquid inside as the ……………… change.
13. From the types of thermometers ………. and ……………….
14. The Celsius thermometer is used in measuring …………
15. The Oxygen gas is produced plentifully from …………. during ………. process
16. The Oxygen gas of the atmosphere is consumed during …………and …………….. processes
17. From the uses of oxygen gas are …………….
18. Carbon dioxide gas is produced as result of the combustion of ………. as …………………. also produced from ………….. of living organism .
19. The properties of carbon dioxide gas are ………………………………………
20. The Nitrogen gas occupies ………….% from atmospheric air .
21. Nitrogen gas is used in manufacture of ………… which does not makes rust
22. The nervous system consists of two main systems are ………. and ……..
23. The brain consists of ………………. , ……………….. and ……………..

24 The axial skeleton consists of ……….. and ……………….. and ……………….

Second question: Put (√) or (×) in front of each of the following statement:

1. The mass of the body changes as its location changes.
2. The digital balance is used in measuring weight.
3. Copper is considered from bad conductor substance.
4. Aluminum conduct heat faster than copper.
5. Mercury is considered from bad conductor substance.
6. Celsius thermomter is used to measure human temperature.
7. Carbon dioxide gas turns clear lime water turbid.
8. Nitrogen gas is called azote and its meaning gas of life.
9. In legumes plants the nodular bacteria fix nitrogen of atmospheric air.
10. The location of medulla oblongata is below cerebellum and joins the brain by spinal cord.
11. From the brain, 10 pairs of cranial nerves comes out.
12. The wrist joint is consider as freely movable joint.
13. The spinal cord is responsible for reflex action in human body.
14. The cerebellum is the center of the main control in your body.

15. Carbon dioxide is used in manufacture of soft drink.

Third question: Write the scientific term for each of the following

1. The amount of matter that the body contains .
2. The amount of earth gravity to the bodies .
3. The substances that allow heat to pass through .
4. The substances that not allow heat to pass through.
5. An instrument used for measuring the temperature .
6. The gas that turns lime water turbid.
7. A gas used in its preparation hydrogen peroxide .
8. A gas produced from respiration and comes out with exhaled gas.
9. A gas used in the storage petroleum and some inflammable substances.
10. The building unit of nervous system .
11. A bony case that contains brain inside.
12. A part of nervous system that responsible for the transfer of nervous message from different parts of the body to the brain and vice verse .
13. It consists of 33 bony vertebrae .

14. Types of muscles act spontaneously and can not be controlled.

15. Group of joints that allow movement in one direction.

16. Long strips that fix muscles on bones .

Fourth question: Correct the following statement

1. The shoulder joint is considered from immovable joints.

2. The cartilages join between muscles and bones.

3. The number of cranial nerves is 31 pairs .

4. The spinal cord controls heart beats.

5. The location of cerebellum is behind the brain over the two cerebral hemispheres.

6. The axon of the nerve cell is surrounded by gelatinous layer.

7. Synapse is formed as result of connection of nerve cell axons.

8. Nitrogen gas dissolves in water.

9. Oxygen gas is used in cooling.

10. The molecule of Ozone gas consists of four Oxygen atoms .

11. The graduation of clinical thermometer is from 37°C to 45°C and each degree is graduated to ten parts.

12. The different metals transfer heat by the same rate .

13 The mass of a body on earth's surface equal 6 kgm, so it's mass on moon surface equal 1 kgm.

14 The mass of one liter of distilled water equals 100 gm .

15 The liquid used in clinical thermometer is the alcohol.

Fifth question: Choose the correct answer from the following:

1 The joints which allow movement in one direction only are called...... joints.

a) immovable b) slightly movable c) freely movable

2 The locations in which the bones meet together are called .

a) tendon b) joints c) humerus

3 The planet on which the body weight equals 6 times as its weight on the moon is

a) mars b) earth c) Jupiter

4 The weight (Newton) = the mass (kilogram) × ....

a) 10 b) 100 c) 1000

5 If the body weight on earth surface equals 6 Newton , its weight on moon surface equals .... Newton

a) ½ b) 1 c) 1/ 6

6 The central nervous system consists of ....

a brain	b spinal cord	c all the previous

7 A gas can be prepared by using calcium carbonate powder and dilute hydrochloric acid is ....

a oxygen	b nitrogen	c carbon dioxide

8 When the exhaled gas passed through clear lime water, it becomes turbid forming substance called ....

a calcium carbonate	b calcium oxide	c calcium hydroxide

9 .... gas is one of the components of gunpowder.

a oxygen	b carbon dioxide	c nitrogen

Sixth question: What is the scientific reason for each of the following?

1. The bodies always fall down towards earth .
2. Cooking pots are made of aluminum while its handles are made of plastic or wood
3. The balance scale must be on horizontal stable surface.
4. The wire of spring balance expands when a body is hanged to it .
5. The weight of the body on earth´s surface differs from its weight on another planet .
6. The body weight in a balloon is different from its weight on the earth´s surface.
7. In clinical thermometer there is a constriction above mercury reservoir.
8. Manganese dioxide still without change in quantity and properties during preparation of oxygen .
9. Ozone gas is very important in nature .

10. The ratio of carbon dioxide gas increases in nature in last years .
11. Carbon dioxide gas is used in putting off fires .
12. Yeast is added to dough during making bread.
13. Carbon dioxide gas is important for the nature .
14. Pungent odour is evolved as result of addition of water to the product of burning magnesium in nitrogen.
15. Nitrogen gas is called azote.
16. The staying away from tranquilizers and stimulants .
17. The cerebellum has great importance during the movement of the body.
18. The infection of medulla oblongata causes death.
19. The withdrawal of hand quickly upon touching sharp pin or hot body.
20. The necessity of eating healthy food rich in calcium.
21. We can not control the muscles of alimentary canal, blood vessels and urinary bladder .

22. The appendicular skeleton system is important for human life .

23. The muscular system is consider as the main engine of our body.

24. There are cartilages between the vertebrae of the back bone .

25. There is a brain inside the skull .

26. The decrease of green area harms the environment.

27. Oxygen cylinders are used during mountain climbing .

Seventh question: What is the importance of each of the following?

1. Earth gravity .
2. Thermometers .
3. The two arm balanced scale .
4. Spring scale.
5. The plastic handles of cooking pots.

6. The rib cage .

7. The cartilages .

8. The tendons .

9. The joints.

10. The dendrites of the nerve cell.

Eighth question: Compare between each of the following :

1. The two arm balance scale and Spring scale.

2. The central nervous system and peripheral nervous system .

3. The axial skeleton and appendicular skeleton .

Ninth question: **What is the main use of?**

1. The good heat conductor substance .
2. The bad heat conductor substance .
3. The oxyacetylene flame .
4. Clear limewater.
5. Manganese dioxide in oxygen preparation.
6. Carbon dioxide in our daily life.
7. Nitrogen gas in our daily life.

Tenth question: Define each of the following

1. Mass.
2. Weight.
3. Heat.
4. Temperature.
5. The good heat conductor substances.
6. The bad heat conductor substances.

Eleventh question: What would happen in the following cases to?

1. A mass of cleansing before and after heating.
2. The decrease of the carbon dioxide quantity in nature .
3. The decrease of the oxygen quantity in nature.
4. The decrease of the nitrogen quantity in nature.
5. There is no earth gravity.
6. The over take of stimulating substances.
7. Jumping from high places.

Twelfth question : Join from column (a) what is suitable from column (b)

1

(A)	(B)
(a) gram	1- is the measuring unit of the weight
(b) kilogram	2- is the measuring unit of temperature
(c) Newton	3- is the measuring unit of heavy body mass
(d)Celsius degree	4- is the measuring unit of light body mass
	5- is the measuring unit of volume

2

(A)	(B)
(a) Copper	1- is bad conductor of heat
(b) Plastic	2- conducts heat faster than aluminium
(c) Mercury	3- is a liquid used in manufacture of thermometers
(d) Alcohol	4- is a liquid used in sterilizing of thermometers before usage
	5- is used in manufacture of fertilizers

3

(A)	(B)
(a) cranial nerves	1- responsible for involuntary processes
(b) spinal nerves	2- responsible for voluntary processes
(c) medulla oblongata	3- responsible for reflex actions
(d) spinal cord	4- are 31 pairs of nerves
(e) cerebellum	5- are 12 pairs of nerves
(f) the brain	6- are found inside skull
(g) the two cerebral hemispheres	7- keep the balance of the human body during movement
	8- is the building unit of nervous system

4

(A)	(B)
(a) vertebral column	1- prevent friction between vertebral
(b) rib cage	2- the position in which bones meat
(c) tendons	3- Long strips join between muscles and bones
(d) joints	4- consists of 33 vertebrae
(e) cartilages	5- consists of 12pairs of ribs
(f) slightly movable joints	6- allow movement in one direction only
(g) freely movable joints	7- allow movement in all directions
	8- protect the brain and all head organs.

Therteenth question:

Answer the following:

1. A body its mass 10 Kgm, calculate its weight on earth's surface .
2. A body its mass 6 kgm, calculate its weight on earth's surface and also calculate its weight on moon's surface.
3. Calculate the mass of a body its weight 300 Newton.
4. Mention two methods to keep:

   a. Nervous system.

   b. Skeletal system.

Exams on first term

Exam (1)

1 Complete the following statements:

a) The human sketetal system consists of .... and ....

b) The .... is the measuring unit of mass whereas the .... is the measuring unit of weight.

c) The .... thermometer is used to measure the water temperature.

2 Put (✓) or (✗) in front of the following statements and correct the false ones:

a) In the spinal cord, there are centers responsible for sensory and kinetic responses. (   )

b) Mass is the force of earth's gravity to an object. (   )

c) Heat transfers from a cold object to a hot object. (   )

3 Mention the function of:

a) Cartilages between the vertebrae of the backbone.

b) Nerves.

c) Mercury in the medical thermometer.

d) Plastic in the manufacture of the handles of cooking utensils.

4 Give reason for the following:

a) The rib cage surrounds both the heart and the lungs.

b) Your weight on the moon is less than your weight on the earth.

5. **What happens if:**
   a. All the bones of the human body are without joints?
   b. When you put your hand suddenly on a hot surface?
   c. We get rid of soil bacteria?

6. **Write the scientific term for the following statements:**
   a. A system responsible for integration and coordination between systems of the human body.
   b. A device used to measure the mass of objects.
   c. Materials that let heat flow through.
   d. An organ responsible for the reflux actions of the body.

Exam (2)

Question one:

Choose the correct answer:

1 All the following from the components of central nervous system except:

a Spinal nerves.
b two cerebral hemispheres.
c Spinal cord.
d medulla oblongata.

2 The weight of the body on earth surface 6 Newton ,so its weight on moon surface equals:

a 1 kgm.
b 1 Newton.
c 6 kgm.
d 6 newton.

3 All the following from substances which are good conductors of heat except:

a Aluminum and iron.
b copper and iron.
c Glass and wood.
d Aluminum and copper.

4 The gas which is used with acetylene in welding metals is .... gas.

a Oxygen
b Nitrogen
c hydrogen
d carbon dioxide

5 When a glowing magnesium ribbon is placed in a jar containing carbon dioxide, on the walls of the jar, the element formed is:

a Magnesium.
b Nitrogen.
c Carbon.
d Oxygen.

Question two:

Explain the following:

a There is a restriction in the capillary tube above mercury reservoir in clinical thermometer.

b The mercury gives wide range to measure the temperature.

c During oxygen preparation in the laboratory, the gas is collected by down displacement of water in the jar.

d Nitrogen gas is used in the atmosphere of the stores of explosive liquids.

e It is essential to heat healthy food which is reach in calcium and phosphorus.

Question three:

A - What would happen in the following cases:

a) There is no oxygen in the atmospheric air.

b) When the shoulder joints becomes from the limited movement joint.

c) Drinking big quantities of soft drink.

B - Mention one function for the following:

a) Joints.

b) The peripheral nervous system.

Question four:

A - Explain ,how to obtain each of the following:

a) Nitrogen from atmospheric air.

b) Carbon dioxide from calcium carbonate powder.

B - Mention one function for the following :

a) Cerebellum.

b) Clinical thermometer.

c) Nitrogen gas.

Question five :

Correct the following statements:

a) Copper from substances which the heat cannot pass through it.

b) The joints of the skull are from limited movements joints.

c) As the weight of the planet increases the weight of body on it decreases.

d) Oxygen gas not burn and not help burning.

e) Carbon dioxide is from the component of gunpowder.

f) When a glowing magnesium ribbon is placed in a job containing oxygen gas, a black substance is formed.

Exam (3)

Exam (3)

Question one:

Choose the correct answer

1. If the weight of a body is 20 Newton , its mass equals:
   - a 2 Kg.
   - b 20 Kg.
   - c 200 Kg.
   - d 2000 Kg.
2. From the measuring units of weight:
   - a Gram.
   - b litre.
   - c Newton.
   - d Kilogram.
3. The maximum and minimum graduation of the clinical thermometer is between:
   - a 35 : 42 celsius degrees.
   - b 35 : 45 celsius degrees.
   - c 32 : 42 celsius degrees.
   - d 32 : 45 celsius degrees.
4. Carbon dioxide gas is used in:
   - a Steel industry .
   - b Gunpowder.
   - c Ammonia industry.
   - d Bread.
5. Which of the following is from .... joints ?
   - a Thigh.
   - b Shoulder.
   - c wrist.
   - d knee.

Question two:

A - Mention one function for each of the following:

- a Spinal cord.
- b Spring Scale.

B - Write the scientific term for the following:

- a A tool used to measure body weight.
- b A gas used in photosynthesis process.
- c Spontaneous response from the body to the different stimuli.
- d The amount of matter that the body contains.
- e The center of main control in human body.
- f A tool used to measure human body temperature.

Question three:

Correct the following statements:

a The weight is constant amount changes as the location changes.

b Alcohol is the liquid that used in medical thermometer.

c Carbon dioxide gas is essential to form rust.

d A black precipitate is formed when carbon dioxide gas is passed in lime water.

e Nitrogen gas is used in putting off fires.

Question four:

What would happen in the following cases:

a All substances, that the man uses are good conductor of heat.

b A nail wetted by water is exposed several days to humid air.

c A man is exposing to noise continuously.

Question five:

Write one difference between:

a Wide movement joints and limited movement joints.

b Oxygen gas and nitrogen gas.

c Mass and weight.

Exam (4)

First Question:

Complete the following statements:

a. The mass is measured by using .... and the weight is measured by .... unit.
b. From the examples of substances which are good conductors which are good conductors of heat .... and ....
c. The clinical thermometer is graduated from .... to ....
d. Oxygen is produced from .... process and carbon dioxide produced from .... process.
e. The number of cranial nerves in human body is ....
f. The axial skeleton in the man consists of ...., ... and ....

Second Question: Choose the correct answer:

1. **The thoracic cage in the man consists of .... Pairs of ribs.**
   - a. 10.
   - b. 11.
   - c. 12.
   - d. 13.
2. **The part which is responsible for keeping human body balance is:**
   - a. Two cerebral hemispheres.
   - b. Cerebellum.
   - c. Medulla oblongata.
   - d. Spinal cord.
3. **The gas used to fill some types of lamps is:**
   - a. Oxygen.
   - b. Ozone.
   - c. Nitrogen.
   - d. Carbon dioxide.
4. **Photosynthesis process in the plant depend on the presence of:**
   - a. oxygen.
   - b. nitrogen.
   - c. carbon dioxide.
   - d. ozone.
5. **The weight of the body is measured by .... scale.**
   - a. spring.
   - b. sensitive.
   - c. double pans.
   - d. all the previous.

6 The best metal in conducting heat is:

a. Aluminum .
b. copper.
c. iron.
d. mercury.

Third Question: Write The Scientific term:

a. The amount of matter that the body contains .
b. Tools used to measure the temperature .
c. A gas used to put off fires .
d. A gas molecules consists of three atoms of oxygen .
e. A part of nervous system responsible for reflex action .
f. The location of bones touch and allow moving .

Fourth Question: Give reasons for the following :

a. The yeast is added to dough .
b. Damage medulla oblongata lead to death .
c. Aluminum is used in manufacturing of cooking pans .

Exam (5)

Exam (5)

First Question:

Complete the following statements :

- a From the examples of substances which are bad conductor of heat .... and ....
- b The number of vertebrae of vertebral column is ....
- c The number of cranial nerves is .... and the number of spinal nerves is ....
- d The holder of cooking pans is made of ....
- e The mass is measured by .... scale and the weight is measured by .... scale.
- f Oxygen is prepared from .... in presence of ....

Second Question: Choose the correct answer:

1 The gas which turn lime water turbid is .... gas.

- a Oxygen.
- b Nitrogen.
- c Carbon dioxide.
- d Ozone.

2 Nitrogen is used in manufacture of:

- a Fire extinguisher.
- b Fertilizers.
- c Soft drink.
- d dry ice.

3 Your weight on earth surface is 600 Newton so your weight on moon surface is .... Newton:

- a 6
- b 60.
- c 100
- d 10

4 The centers of thinking and memory lie in:

- a Medulla oblongata .
- b spinal cord.
- c cerebellum.
- d two cerebral hemispheres .

5 From the example of freely moveable joints ....

- a Knee
- b thigh.
- c elbow
- d all the previous

6 **Hydrogen peroxide is used in preparation of:**

a Hydrogen. b Oxygen.
c Nitrogen. d Carbon dioxide.

Third Question: Write The Scientific term :

a The attraction force of the earth to the body.
b A flame used in cutting and welding metals.
c A gas used in ammonia industry.
d The center of the main control in human body.
e Ligaments ties muscles with bone.
f Areas between vertebrae of vertebral column separate and protect from friction between them.

Fourth Question: Compare between each of the following:

a Mass and weight.
b Clinical thermometer and Celsius thermometer.
c Central nervous system and appendicular nervous system.

Exam (6)

First question: Complete the following statements

1. The attraction force of earth for a body is called .... and it increases as .... increases .
2. The types of thermometers are ....and ....
3. The sources of carbon dioxide gas are ...., ... and ....
4. The main center of the control in your body is .... and it is found inside bony case called ....
5. The skeletal system in human consists of ....and ....

Second question: write the scientific term

1. The amount of matter in an object .
2. The materials that let heat flow through .
3. The automatic response of the body when it exposes to outer stimuli.
4. The system which is responsible for the communication and coordination between human body systems.
5. The main source of preparing nitrogen gas .

Third question:

A- Rewrite the following sentences after correcting the wrong

1. The mass is measured by Newton which is equivalent to 1000 gram.
2. The spinal cord is responsible for the controlling the involuntary processes in our body .
3. Nitrogen peroxide gas decomposes to water and nitrogen in presence of manganese dioxide .

B- The mass of an object on earth's surface equals 60 kgm, calculate its weight on moon's surface .

Fourth question: Give reason for the following

1. Oxygen gas is collected by down displacement of water during its preparation in the laboratory.
2. We must not taking sleeping tablets otherwise if the doctor advised it.
3. Carbon dioxide gas is used in putting of fires .
4. The heart and lungs are surrounded by rib cage .

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